project file

Preliminary Report

ASSESSMENT OF PFU PRODUCT AND SERVICE DIRECTIONS

Submitted to

PFU

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Submitted by

INPUT

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ASSESSMENT OF PFU PRODUCT AND SERVICE DIRECTIONS

I. BACKGROUND

INPUT has been engaged by PFU to assess and make recommendations on PFU's product and service directions. The project began with a worksession at INPUT's offices in Mt. View, California from January 31 to February 2, 1996. At the worksession:

- PFU briefed INPUT on its products, organization, and desired requirements.

- INPUT reviewed the following market and technical issues with PFU:

    - Systems integration and outsourcing
    - Electronic commerce and the Internet
    - Client/server software
    - Network-centric computing

INPUT supplied PFU with a large amount of printed material and analyses on the above topics.

At the completion of the worksession, it was agreed that INPUT would submit a report to PFU covering the following:

- *Assessment and recommendations concerning PFU's product directions*
- *Assessment and recommendations for PFU service opportunities.* PFU and INPUT agreed that emphasis should be placed on services, because of the longer term opportunities in services.

PFU also requested that INPUT suggest a phrase or descriptor that will describe PFU's expanded mission. (Analogous to the use of "network-centric computing" by IBM.)

This report is organized as follows:

- Product analysis and recommendations
- Services recommendations
- Service skills requirements and sources
- Recommendations

In the worksession discussions, INPUT and PFU agreed that. for the next 1-2 years PFU's primary focus will be on the Japanese market. However, in the longer term PFU will be competing in the international market as well. INPUT's analysis and recommendations keep a focus on the worldwide market:

- This will be the market that PFU will be increasingly competing in.
- Over time, the trends now evident in the U.S. market will become increasingly strong in Japan

PFU will review this report; afterwards, PFU and INPUT will meet to review INPUT's analysis and recommendations. INPUT will then issue a final version of this report, which will take into account the questions and comments made during the review process.

II. PC Card Market Analysis

This chapter describes the market for PC Card products.

A. Market Segmentation

The market for small computer boards that are PC-compatible is analyzed. Most manufacturers do not sell a simple PC, rather they add value by providing special interfaces. The market segments for such a product may be divided into the following:

- telecommunications and networking
- real-time data acquisition and process control
- publishing and printing
- hand-held computers and devices

Market opportunities for PC boards that PFU could consider, but are not recommended by INPUT and are not discussed further include:

- storage controllers - large crowded market with established players
- automobiles - established vendors are already supplying the market

1. Telecommunications and Networking

Applications include:

- smart telephones
- telephone equipment, such as key system consoles that connect several telephones
- telecommunications test equipment

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II

- web servers on a small boards

Product characteristics:

- support for telephony interfaces
- reliability
- high volumes

This is a large market, but it is also difficult to enter. AMD is working with its partners to target this market. It is not recommended that PFU enter this market.

2. Real-time Data Acquisition and Process Control

Applications include:

- laboratory equipment monitoring and data collection
- plant monitoring
- remote data collection from sites such as wells, electricity meters

Real-time opportunities are expanding. The stringent requirements of process control systems that PFU has expertise in through its minicomputer may be translated to new applications, where the real-time requirements are less critical. The meaning of the term real-time has changed with the advent of online networks. New real-time applications may not require synchronous networks, they just require streams of data to be handled fast and efficiently. For example, a user with a hand-held computer may want to receive online information feeds as well as information from lab equipment. It is recommended that PFU explore this market with its current customer base and OEM partners further.

3. Publishing and Printing

Applications include:

- embedded controllers for printers, copiers, fax machines and print spoolers
- embedded web servers

This is an emerging market, but PFU may not have any specialized expertise to contribute. However, it may be able to gain some expertise

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and develop integrated product lines and solutions here, applying its real-time expertise to online data collection.

4. Hand-held Computers and Devices

Fujitsu is a recognized leader in this area, particularly in vertical markets like delivery truck driver support. PFU needs to consider whether it can supply its technology to Fujitsu to augment its solutions for the real-time market.

Applications include:

- hand-held test equipment
- PDAs
- hand-held computers

PFU should consider supplying Fujitsu with PC Cards so that Fujitsu can extend its already strong market penetration in hand-held computers and devices.. If it proves difficult to supply Fujitsu, then PFU should find out why and develop an appropriate competitive response.

PFU is unlikely to provide its PC Cards for high-volume consumer applications. Companies like HP and Sharp that provide hand-held personal information managers are more likely to build their own boards and deal with semiconductor suppliers directly. PFU may consider hand-held test equipment that supports its real-time process control business as an opportunity.

B. Trends

- **Programmable logic means customize circuits for specific markets.** They can develop high margin products, because of the customization that they add. These variations may enable support for different peripherals, tuning of the CPU and ability to support add-on daughter-boards. Vendors offer boards with many processor options - different speeds - and many memory configurations - different memory modules.

- **Bus architectures are changing.** The standard for PCs is the PCI bus. PC cards often need to run under other architectures, such as VME-bus. PFU needs to consider what other buses it may support.

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New bus standards are emerging from Intel and Microsoft that PFU may want to consider if it is to leapfrog the competition.

- **PCs on a PCMCIA card are starting to appear.** If PFU is serious about the board market it needs to consider miniaturizing its technology further to put PC boards into ever smaller devices.
- **Real-time opportunities are expanding.** With the advent of the Internet and more networked applications opportunities for using small PC boards are expanding.
- **Live insertion of boards.** Customers do not want to bring their systems to a stop to install boards. They often need to be able to swap out failed boards and keep the system running.

C. Trade-offs and Issues

1. PC Compatibility

There is a trade-off between providing a standard PC solution and providing one that runs PC software, but also provides other features. PFU is advised to make its products able to run PC software, but also to enhance its boards with modules to support its PC market.

2. Operating System Performance

PC operating systems like Windows or DOS do not perform well for time-critical, multi-threaded operations. For its PC board products PFU needs to establish whether it will support standard OSs or real-time OSs or both for OEM customers.

3. Bus Support

The ISA bus is currently supported. PFU must decide which buses to support in the future. There are advantages to running the PC Card with other types of computers.

4. R&D Investment

How much is PFU prepared to spend on keeping competitive with PC Card technology? To be a full-line PC Card supplier, PFU needs to provide support for peripherals, particularly in its factory automation markets. It can expand its product line by investing in different dimensions as shown in Exhibit II-1. Three dimensions may be considered:

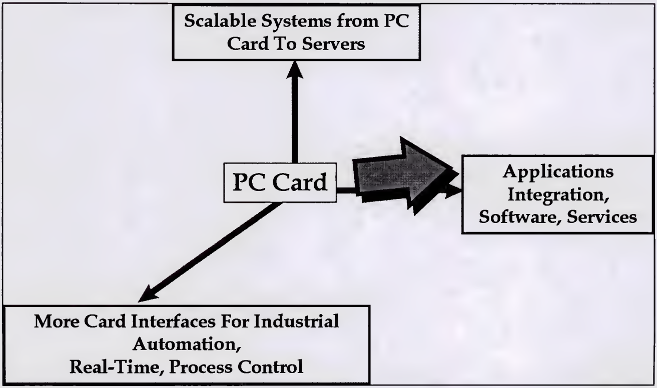
- **Building a scalable product line from PC Card to servers that can run binary compatible software.** This need not be a primary thrust for PFU, but it enables to leverage its investment in software for different sized computers. It also enables it to sell a range of solutions to its customers.

- **Create more card interfaces for industrial automation, process control and real-time applications.** This may be a feasible direction to satisfy PFU's customers. However, it is likely to be better to encourage third parties to develop the interfaces A risk is that this sets up competitors to PFU in its applications solutions business.

- **Focus on applications integration, software and services.** This is the direction that INPUT recommends PFU spend most of its resources. Software may be licensed from or sold directly by third party software providers. PFU may choose to be a systems integrator, or it may decide to identify all the pieces of a solution and then partner with a recognized systems integrator.

EXHIBIT II-1

Possible Investment Directions


Scalable Systems from PC Card To Servers
PC Card
Applications Integration, Software, Services
More Card Interfaces For Industrial Automation, Real-Time, Process Control

Source: INPUT

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D. Industry Structure

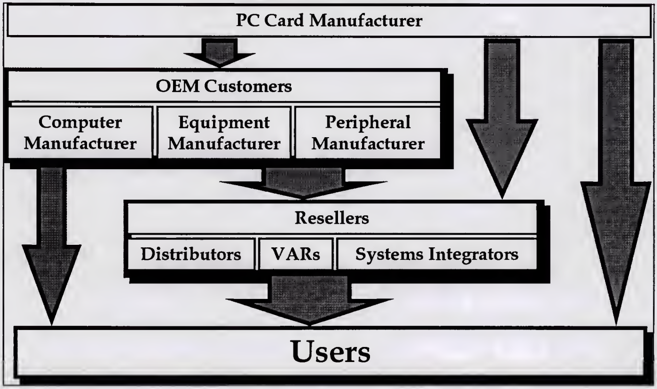
PFU needs to decide how it will distribute its products and reach the customer. It could sell directly to OEMs, through its partners or through resellers. It needs to decide in entering the U.S. market whether it will:

- sell to Japanese OEMs who then sell products in the U.S. that use PFU's PC Card
- sell directly to U.S. OEMs

Exhibit II-2 shows industry structure. PFU needs to decide on its distribution channels and how it will reach users.

EXHIBIT II-2

PC Card Distribution Channels



Source: INPUT

The PC Card business is made up of:

- manufacturers (see Appendix 1 for a "snapshot" of products/vendors)
    - many are offshore, mainly in Asia

    - some are small
    - some may sell complementary products and be also distributors
- OEM customers
    - they embed the PC Cards into their products
    - they add value by integration, software and possibly by asking PFU to make custom modifications to its PC Card
- Resellers
    - VARs - small regional resellers
    - Distributors and mail order companies - carry several electronic products, need finished product, do not add hardware or software
    - Agents - act as a PFU sales rep
- Users
    - Final purchasers of products that use PFU's PC Cards
    - Purchasers of PC Cards that use them for their own use - these may include programmers and testers

E. What It Takes To Be Successful in the OEM Market

To be successful as an OEM supplier to the U.S. market, PFU needs to establish:

- market presence via public relations and trade show appearances
- credibility with about three significant OEMs that can be used as references
- that it can keep its technology advanced and innovative

PFU needs to target its products where it is critical to an OEM's business. Projects that are not mainstream may be underfunded and difficult to support. PFU should leverage its expertise with industrial automation.

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F. Observations

- The board business is very competitive
- The board market has already fragmented into separate segments
- It is a reasonable business for an offshore vendor to enter, providing products can be distributed widely and brand recognition can be obtained
- PFU risks being squeezed between the semiconductor vendors and existing board manufacturers if it tries to become a mainstream board supplier
- When Sun Microsystems started there were many workstation vendors. Sun supplied these vendors by selling an "open", standard product. It may be that with PFU selling a PC-compatible PCMCIA card it can sell to existing card vendors with non-standard cards. Cards on non-standard platforms, like Zilog's Z80 and AMD's 29xxx series of processors would be displaced by such a strategy. This would be very hard to execute, require heavy promotion, but is not impossible.
- PFU needs to aim to be number one in whichever segment it selects. By selling a card product, it could enhance its reputation as a supplier of its traditional process control systems.
- PFU needs to do in-depth analysis of its customer base to identify new and emerging applications that it can leverage.

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G. Recommendations

- PFU needs to have adequate financial backing before entering the U.S. OEM market. Selling into OEM markets can be very unpredictable from a cash-flow perspective:
    - ⇒ when sales are good they can be really good
    - ⇒ if a single customer representing a large share of business cancels orders it can be disastrous
    - ⇒ selling an order can take a long time and if an order is not closed in time, it can affect cash flow adversely
- PFU needs a range of products to be successful in the board business. It needs to extend its product line to provide boards with modular interfaces.
- PFU has two alternatives for distributing its board:
    1. Work with a major Japanese company like Fujitsu or Panasonic that has brand name recognition and get them to market it through its distribution channels in the U.S.
    2. Work directly with major U.S. distributors and sell directly to U.S. OEMs

H. Opportunities

- PFU needs to focus its marketing efforts for the core business. Target customers building complementary products to PFU's real-time business, for applications such as data acquisition and process control
- Emerging opportunities include:
  - embedded web server boards
    - Printers, vending machines, industrial equipment need to report their status to remote sites. This can be done by making a miniature web server and putting it on a board and enabling users to monitor their equipment over the web.
  - remote site monitoring devices
  - miniature intelligent peripherals
    - business card scanners

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To be successful with the PC board, PFU needs to consider taking the following steps:

- select market segments, INPUT recommends:
  - ⇒ data acquisition and control
  - ⇒ real-time embedded Internet applications
- select applications within market segments, INPUT recommends:
  1. for data acquisition and control market
     - ⇒ go to existing customers and identify opportunities, test if these can be sold to similar companies
     - ⇒ support the solutions built from board products with full-sized computer systems, applications software and services
     - ⇒ new customers may include:
       - * power utilities
       - * telephone companies
  2. for real-time embedded Internet applications market
- identify OEM suppliers to the customers
  - ⇒ Fujitsu
  - ⇒ Matsushita
- decide what is needed to make a full customer solution
- decide which parts of the full solution PFU will supply and which parts other firms will supply or market
- develop financial plan to create products and see if viable, if not adjust plan
- execute plan

III. SERVICE RECOMMENDATIONS

A. Overview

There are many, good service opportunities. PFU's -- and INPUT's -- challenge is to prioritize and focus on those that are most suitable for PFU.

INPUT's analysis of service opportunities has identified two areas that represent immediate opportunities:

- Supplying PC Card-related services

- Providing desktop/LAN-related services

Services connected with Network-Centric Computing (NCC) represent a longer term opportunity.

In principle, systems integration and applications-focused services represent an excellent long-term opportunity. However, INPUT does not recommend that PFU address this market immediately.

The remainder of this chapter examines these service opportunities.

B. PC Card-Related Services

Chapter II discussed the issues facing PFU from the standpoint of its PC Card as a product. Whatever direction PFU's PC Card business takes, PFU will still have knowledge and reputation in this segment. PFU can leverage these capabilities to provide services that are related to the PC Card.

Focus is extremely important in this area. Just as there are a number of directions that the product business can take, there are also different directions that the services-related business can take. PFU must carefully choose the services direction.

INPUT has found it useful to divide applications between

- Data-oriented platforms
- Embedded systems

The exhibit below illustrates the differences. (The examples are not meant to be exhaustive)

Exhibit III-1

Applications Related to Data-Oriented Platforms

- Sales catalogs/price lists
- Order entry (outside salespeople)
- Product configuration/parts explosions
- Inventory
- Warehousing
- Wireless data transfer/acquisition
- Super-PDA
- Construction management
- On-site construction estimating
- Equipment maintenance
- Law enforcement database
- Mobile health diagnosis assistant
- Insurance claims adjusting

Exhibit III-2

Applications for Embedded Systems

- Global positioning terminal (personal, automobile)
- Vehicle driving control systems
- Vehicle subsystems management
- Laboratory equipment control, data acquisition and analysis
- Continuous batch manufacturing monitoring and control
- Hazardous waste monitoring and management
- Utility distribution monitoring (water, gas, electricity)
- Building systems management (heating, air conditioning, etc.)
- Utility meter reading

INPUT does not believe that PFU should become expert in particular applications or uses: There are far too many and, more importantly, PFU would end up competing with its customers and OEMs.

Instead, PFU should become expert in the selection, customizing and production of specialized PC Cards. This may sometimes create tension between the product and service sides of the PC Card business -- sometimes the services group would have to recommend a competing card.

- This will create a positive image in the market.
- Equally important, in the long run this will reduce PFU's dependence on the PC Card as a product. Instead, PFU would be in a position to supply high value-added expertise independent of whether PFU was in the manufacturing business.

C. Desktop/LAN-Related Services

Desktop/LAN related services represent a growing subset of network-related services. These services are an important part of network-centric computing and extend across virtually every business of any size. The primary technical environments will be Microsoft or UNIX platforms.

INPUT does not recommend that PFU provide conventional Wide Area Network (WAN) services or those connected with traditional host or mini networks. These markets are not growing as quickly and competition is quite intense.

The exhibit that follows shows the primary services that INPUT recommends that PFU consider. However, INPUT does not recommend that PFU attempt to provide all of these services at first, because of

- PFU's own resource constraints
- The importance of proving the quality of offerings
- The time required to obtain a reputation in the market and market acceptance

Exhibit III-3

Desktop/LAN Services

Customer Services

- Equipment/cable installation, modification, moves
- On-site equipment repair
- Depot (carry-in) maintenance and repair

Planning, Management and Support

- Desktop planning (and training for planning and administration)
- Asset (hardware and software) identification and management
- Standard help desk support (providing assistance to internal users of customers on how to use installed standard hardware and software)
- Training for standard software products

Software Support

- Complex software installation
- Software problem identification and troubleshooting (beyond standard help desk support)
- Custom software development

Desktop/LAN Management/Outsourcing

INPUT recommends that PFU prioritize its the timing and size of its service offerings by assessing the following:

- The extent to which PFU has capabilities in each area (whether or not it is using them to provide a commercial service)
- The extent to which PFU is providing a service to one of its current customers.
- The extent to which PFU could find new customers
- Potential profitability
- The extent to which a service could utilize redeployed PFU staff. (See Chapter IV for further discussion of this)
- The competitive environment

D. Network-Centric Computing-Related Services

Within NCC there is a cluster of "background technology" expertise that will be necessary to support NCC-related services. These are driven by the application needs of NCC. The background technologies that will be most important are shown in the exhibit below. These background technologies are "horizontal" in nature (i.e., non-application specific) -- however, these background technologies are driven by the needs of specific applications and industries. These applications/industry drivers were reviewed with PFU at the earlier worksession and are summarized in Appendix 2.

Exhibit III-4

NCC BACKGROUND TECHNOLOGIES

- Operating Systems
- Middleware
- Information Warehouses
- Object Technology
    - Databases
    - Methodologies
    - Libraries
- Imaging
- Wireless Communications
- Broadband and Heterogeneous Networks

PFU's medium-term (2-4 year) objective should be to develop a core of knowledge in these areas so that it can intelligently select and work with larger partners when a project requires the mobilization of a large number of people in a short period of time.

E. Systems Integration and Applications-Related Services

As shown in Appendix 2, INPUT sees the future in NCC-driven applications. Over the next ten years many current applications will be replaced with NCC applications. To be a major player in this market requires:

- A high level of systems integration and complex project management skills
- A mastery of diverse NCC technologies
- A deep knowledge of specific industry practices and applications

Many of the leading systems integration firms are themselves struggling to meet all of these requirements. In the medium term (the next 2-4 years), PFU should not try to compete directly with these firms, but enter into partnerships with them, especially in Japan. These partnership experiences will permit PFU to evaluate the areas it wishes to specialize in.

IV. SERVICE SKILLS

One of the most important tasks facing PFU is how to development the skills necessary to support a services business. This chapter examines:

- The types of skills required
- The sources of these skills

A. Skills Required for the PC Card Service Business

These skills would be those involved in designing, customizing, selecting and installing special-purpose PC Cards. These skills would be grown in-house, using in-house expertise and knowledge gained from working with customers.

B. Skills Required for Desktop/LAN Services

Most of the skills required will be directly linked to the kinds of services that can be offered, that is,

- Maintenance-related skills (for supplying Customer Services)
- Process skills (for supplying Planning, Management and Support Services)
- Technical skills (for supplying Software Support Services)
- Operations skills (for supplying Desktop/LAN Management/Outsourcing Services)

Another important set of skills is for the marketing, pricing and sales of these services.

C. Sources of Skills for Desktop/LAN Services

(Note: As discussed in Section A, above, PC Card service skills would be gained from in-house staff working with customers.)

1. Maintenance-Related Skills

These should be obtainable from current maintenance staff, with proper retraining. See Section C, below.)

2. Process-Related Skills

PFU will need to make an inventory of its own skills to see how many people already have some experience and appear to have the aptitude for retraining. Some systems analysts will have these kinds of skills.

3. Technical/Software Skills

INPUT believes that most PFU software engineers could be redeployed into supplying the software support services described above, with some level of additional training. However, a growing business would soon exhaust the supply of existing employees with the high level of skills required. Hiring experienced staff would probably be difficult because

- These skills are scarce
- INPUT assumes that this type of hiring would be difficult for PFU

A certain number (probably small) of hardware maintenance personnel could be retrained (see section C, below).

Hiring entry-level staff who would receive extensive training should be considered, however, the following factors should be kept in mind:

- Training itself will be lengthy
- There is no substitute for "hands-on" experience
- This will represent a considerable cost, with little financial return, for some time.

INPUT believes that staff acquired in outsourcing contracts could be a very useful addition to PFU's capabilities. (See Section D, below.)

4. Operations Skills

PFU will need to make an inventory of its own skills to see how many people already have pertinent experience and appear to have the aptitude for retraining.

A larger opportunity is in "bootstrapping" these skills by winning outsourcing contracts and using the most capable people as the "kernels" to grow skills and additional business. (See Section D, below.)

C. Retraining of Maintenance Staff

One of the areas of importance to PFU is the extent to which the current maintenance staff can be retrained to provide services. Based on INPUT's knowledge of the experience of U.S. firms facing similar situations, INPUT has provided the analysis below. The key element is INPUT's estimate of what percentage of U.S. maintenance staffs could be retrained for particular skill sets. These percentages may, of course, be different for PFU.

1. Desktop/LAN Customer Services Skillset (and portions of Planning, Management and Support)

- Overview
    - >75% of staff potentially retrainable
    - Market may be crowded with other firms doing the same thing
    - Margins lower than on traditional customer services
- Principal Services
    - Desktop/LAN installation/modifications
    - Desktop/LAN asset identification and management
    - On-site services
    - Depot services

2. Education and Training Services Skillset

- Overview
    - <20% of staff potentially trainable
    - Growing market, but focus changes rapidly
    - Topic selection and internal training critical
- Principal Services

- **Desktop administrator training**
- **Desktop planning**
- **Standard software packages**

3. Network/Standard Software Support

- Overview
    - <20% of staff potentially trainable
    - Rapidly growing market
    - Demanding requirements
- Principal Services
    - Desktop/LAN management and outsourcing
    - Complex software installation
    - Help desk support

4. Software Support

- Overview
    - <5% of staff potentially trainable
    - Rapidly growing market
- Principal Services
    - Problem identification and troubleshooting
    - Custom software development

D. "Bootstrapping" The Outsourcing Business

In the U.S. and Europe, many outsourcing contracts require the outsourcing vendor to employ all of the customer's operations staff. INPUT assumes this would be even more common if PFU were to enter the outsourcing business.

Many Western outsourcing firms have found that these new employees have many valuable skills. At the same time, the outsourcing vendor is often able to introduce higher levels of operational efficiency. Staff that has been freed-up in this way can then be redeployed elsewhere in the vendor's business and/or used as the cadre for new outsourcing contracts.

INPUT believes that PFU should explore this strategy as a way of

- Entering the desktop/LAN outsourcing business
- Acquiring/training staff for difficult-to-fill positions

V. RECOMMENDATIONS

This chapter summarizes the analysis and recommendations made in other chapters and also suggests several descriptors to consider applying to PFU in its new role.

A. Summary of Recommendations

PFU should

- Focus its product development activities on the PC Card, keeping in mind that this is a rapidly changing, competitive field.
- Pay close attention to changes in the technology and market for PC Card products.
- Build on its process control expertise in both products and services.
- Avoid becoming applications focused in the near term (1-2 years) and possibly should not do so over the longer term either, because of the resources required and competition with its own customers.
- Enter the end user services market by supplying desktop/LAN services:
    - The market is large and growing
    - No vendor (or group of vendors) is dominant
    - PFU could utilize some of its own resources, especially hardware maintenance staff in this market.
- Consider becoming an outsourcer of desktop/LAN services.

B. A Phrase to Describe the "New PFU"

The future PFU, following the analysis in this report, will

- Provide advanced technology, especially in the process area
- Be networking-oriented
- Shift from products to services

A new descriptor should reflect that. At the same time, the descriptor should not tie down or limit PFU: The market requirements may be quite different even five years from now -- a name should be able to "live through" changes in market direction.

Keeping these factors in mind, INPUT's preliminary recommendation is

PFU: TECHNOLOGY AND NETWORKING SERVICES

There is intentional ambiguity in this title: PFU can be considered a "technology" firm or a "technology services" firm. If PFU in fact makes a transition from products to services, this descriptor will still be valid.

INPUT considered a number of other descriptors, including:

- Network-Driven Technology and Services
- 21st Century Technology & Services
- The Technology and Networking Company
- PFU Technology and Networking

INPUT will continue to work on further descriptors

Appendix 1: PC Card Products and Vendors

This chapter gives brief snapshots on some of the market players.

A. Vendor Snapshots

Some of the vendors in this section compete directly, like Seiko-Epson, whereas others are possible future competitors, potential suppliers or potential partners.

The most intense competition is expected to come from Taiwan, where there are already many PC board manufacturers. A report from the PC/104 consortium provides more supplier profiles for larger PC/104 boards.

1. Advantech

Advantech is a Taiwanese company. Its U.S. counterpart, Advantech America distributes its products in the U.S.. Advantech is able to supply a full range of products.

2. AMD

AMD is an alternative to Intel as a processor supplier. It has a long history of first selling its own 29xxx processors into the embedded controller market and then Intel-compatible processors. AMD sees a bright future for Personal Information Devices and seeks to be a major supplier of components for that market. It supplies memory components to Motorola, the leading cellular phone manufacturer in the U.S. and already has strengths in telephony markets.

3. Ampro - Potential Competitor

Ampro was the creator of the PC/104 standard. Typical applications include:

- Medical instruments

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- Vehicular data acquisition and control
- Communications devices
- Vending machines
- Machine control
- Security systems
- Test equipment
- Point-of-sale products

4. Hewlett-Packard

HP is one of the most successful packagers of components for small, hand-held computing devices. It already has strong supplier relationships with AMD. HP competes with PFU in the factory automation market.

5. Megatel

Megatel manufactures PC/104 compatible PCs that feature on-board video, Ethernet, ISA, parallel, DIN and serial connections.

Megatel provides small format, PC compatible microcomputers and microcontrollers. Megatel's aims is to increase the power and speed of its products while reducing their size and cost. It targets both OEM an d user markets.

6. Micro Industries

Micro Industries bases its PC/104 motherboard products on AMD processors.

7. Norand Corporation

Norand provides a PEN*KEY 6100 Windows, wireless computer for data collection. Norand makes mobile computing systems. This is the type of application that PFU may consider for its PD2100 card. It could need to add wireless interfaces as an optional, modular feature.

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8. Phoenix Technologies

Phoenix provides BIOS software for PCs and is extending its software to support PC Cards. They have a full set of software for supporting telephony applications.

9. Pro-Log

Pro-Log could be a distributor in the U.S. for PFU. They have a range of industrial PCs on boards, but do not have a PC Card.

10. Seiko-Epson

Seiko-Epson is probably the most formidable competitor in the PC Card field. They were the only vendor exhibiting at the recent PC Card show in San Jose.

11. S-MOS

S-MOS is an affiliate of Seiko-Epson. They make the CARDIO line of PC Cards that are PC-comptaible. Their cards are manufactured by Seiko-Epson. They have both PC/104 and PCMCIA cards.

12. WinSystems

Provides PC/104 computers. They have ROM-DOS and other OSs, including real-time support.

13. Zilog

Zilog targets consumer appliances, telephones and storage controllers with embedded computers based on its own Z80 family of processors. It does not compete with a PC-compatible product, but is considered a competitor because it serves many of the markets that PFU may consider.

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About Advantech

Advantech is ISO-9001 certified and internationally recognized as a leading manufacturer of PC-based industrial automation and control products. Having one of the best price performance ratio~~n~~s in the business, as well as top-notch service, has allowed Advantech to grow continuously since the day our doors were opened in 1982. Our products, which include industrial PCs, workstations, data acquisition cards, signal conditioning boards and application software packages are used by scientists and engineers around the world.

Our sales, marketing, technical support, quality control, and customer service departments are located in our own 20,000 square foot building in Sunnyvale, CA. In addition, this building houses a fully stocked warehouse, so most orders can be filled the same day.

R&D

Research and development is the foundation from which Advantech was built upon. Our research and development team is comprised of almost 40% of our staff. This team continuously turns out new products, sometimes as much as 30 new products over the course of a year. This ever-expanding product line insures that we will be able to meet your needs, both today and tomorrow.

Quality

As an ISO-9001 certified company, Advantech is committed to providing a quality product to its customers. Extensive resources are invested every year to ensure our products will last. Some of our product tests include: EMI, temperature, vibration, shock, and humidity. Only after the product passes our battery of tests do we ship to the customer.

However, quality doesn't stop after shipment. We collect data from our customers and from in-house testing to further enhance the quality of our product. A rigorous product line maintenance program is in place for both new and existing products. As a result of the efforts, we still offer some of the original products first introduced by Advantech so you don't have to worry about becoming obsolete

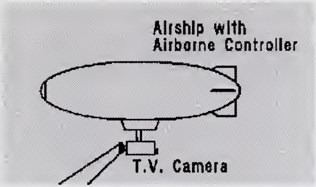
---

Advantech is a Taiwanese company,
Advantech America is described above

]> Advantech America

PCA-6156 Pentium PCI/ISA Bus Single Board Computer

Specifications:
CPU: Intel Pentium 66/90/100/120MHz
Cache memory size: 16KB on-chip and 256KB 2nd level
Bus interface: PCI/ISA-bus
Bus speed: PCI: 33MHz (@ 60 MHz CPU), ISA: 8MHz
Data bus: 64-bit
RAM memory: 2 to 192MB, uses six banks of 72-pin SIMM sockets (72-pin sockets accept 1, 2, 4, 8, 16 and 32MB SIMMs)
PCI SCSI-II interface: Supports PCI local-bus SCSI-II controller interface
Enhanced IDE hard disk drive interface: Supports up to four enhanced IDE (AT bus) hard disk drives. BIOS enabled/disabled
Floppy disk drive interface: Supports up to two floppy disk drives, 5.25" (360KB, 1.2MB) or 3.5" (720KB, 1.44MB, 2.88MB) BIOS enabled/disabled
Bi-directional parallel port: Configurable to LPT1, LPT2, LPT3 or disabled. Standard DB-25 female connector provided, EPP/ECP compatible
Serial ports: Two RS-232 ports with 16C550 UARTs (or compatible) with 16-byte FIFO buffer. Can support speeds up to 56 Kbps. Ports can be individually configured to COM-1, COM2 or disabled.
Real time clock/calendar: Dallas DS-12887 with lithium battery backup for 10 years of data retention
Watchdog timer: Jumper configured to always be disabled or software enabled/disabled. The timer interval is 0.5 ~ 252 sec. (10 level software programmable). Your program uses I/O ports hex 043 and 443 to control the watchdog timer and generate a system reset or IRQ15
PS/2 mouse interface: A 6-pin DIN mouse connector is located on the mounting bracket for easy support of standard P/S2 mouse
Keyboard connector: A 6-pin mini DIN keyboard connector is located on the mounting bracket for easy connection. An external keyboard adapter is included. An on-board keyboard pin header connector is available
Operating temperature: 32° to 140° F (0° to 60° C)
Max. power requirements: +5 V (@ 3.3 A)
Power supply voltage: +5 V (4.75 V to 5.25 V)
Board size: 13.1" (L) x 4.8" (W) (334mm x 122mm) Board weight: 1.2 lbs. (0.25 Kg)



Airborne Control System

The Blimpworks (Statesville, NC, USA) designs and produces a wide variety of blimps and airships. They range from simple stationary advertising blimps, to unmanned gasoline-engine powered airships. Success of their earlier two-engine airship is leading to the design of more sophisticated airships to satisfy a varied market.

Currently being developed is a three-engine, one-person airship with complete instrumentation and electronic controls. Functions such as engine choke, throttle control, engine position and airship rudder control will be controlled electrically. Later versions will be equipped with an airborne computer for dual control (manual and computer) and position locating using a Global Positioning Satellite (GPS) system.

This development will lead to an unmanned airship, controlled by an airborne computer with an up/down RF link for command and control. In addition to the computer system, it will contain a TV downlink and GPS system. Programming will enable it to automatically traverse a pre-determined area based on coordinate inputs from the GPS system. On loss of RF uplink control, it will return to home base by itself. It will be able to release fuel and land in the event of engine loss.

The potential applications of this innovative airship are limitless, including:
- Video imaging
- Law enforcement surveillance
- Forestry management
- Sporting event coverage
- Atmospheric testing

Bench testing to date has shown the feasibility of interfacing an analog joystick controller to Advantech's PCL-812 Enhanced Multi-Lab DAS Card. Square-wave outputs generated by the counters on the PCL-812 and the PCL-720 Digital I/O Card have been used to control the servos for the airship's choke and throttle. Analog outputs from the PCL-726 6-channel Analog Output Card may also be used for similar functions, as well as engine positioning.

The airships airborne computer, designed for Blimpworks by Barry Consulting (Harrisburg, NC, USA), is based around Advantech's PCA-6133 All-in-One 386SX CPU card.

The PCA-6133 proved to be very well suited to airship location control, airborne surveillance and downloading of information to a ground station. It was chosen primarily for its compact size, watchdog timer, serial/parallel ports, and piggyback connector (which conveniently accommodated a PCD-8931 Flash/RAM/ROM Disk Piggyback Module).

The CPU card's watchdog timer serves as a handy system safeguard in case a system error causes the airships program to hang up resulting in a loss of control in the cockpit or on the ground. If the system hangs up, the watchdog automatically resets the CPU.

The PCD-8931 provides a diskless alternative to a hard disk drive. High altitude, cold temperatures, engine vibration and limited space can cause trouble for mechanical disk drives. The Flash/RAM/ROM disk's solid state nature and modular design have been ideal for overcoming these problems, adding a greater degree of system reliability.

Blimpworks' airborne computer control system promises to be an innovative development in video imaging, airborne surveillance, and atmospheric testing applications. Advantech's Industrial I/O and Industrial PC products have been instrumental in the conception, testing and implementation stages of this project.

This application story was contributed by Ambrose Bo Barry of Barry Consulting, Harrisburg, NC, USA. Phone (704) 455-6153.

PERSONAL INFORMATION DEVICES

New technologies, no matter how important or exciting, rarely enjoy immediate success. The telephone is a good example. Alexander Graham Bell probably never imagined the pervasive changes that would result from his invention. Initially, the cellular phone, introduced a decade ago, seemed to be nothing more than a curiosity. Today there are 15 million cellular telephone users in the United States alone.

Personal information devices (PIDs) - applications specific and communications centric - will undergo the same evolution and growth. The first offerings are available now. Parcel delivery companies use PID-like devices for customer signatures and package tracking. Have you returned a rental car recently without entering the rental office to conclude the agreement? You've probably seen a PID in action. Tomorrow's personal communicators promise exciting features such as wireless e-mail and fax, phone, paging, scheduling and instant access to databases of all kinds, with much more to come. These hand-held, portable devices - many of which will be "hardwired" for specific tasks and applications - are one result of the logical convergence of the computation, communications and consumer products industries.

The market for PIDs is expected to accelerate dramatically toward the end of this decade as the infrastructure for wireless communications is built. The good news for microchip manufacturers such as AMD is that the defining attributes of PIDs - small size, light weight, portability, extended battery life, ease of use and the ability to communicate - dictate that the primary hardware value provided by these machines will be resident in the silicon chips that make them possible. ICs for PIDs must be highly integrated, operate at ever-lower voltages, include power management features, and combine communications and computation capabilities.

AMD excels in each of these areas and is positioned to create circuits that will eventually make PIDs as simple to operate, inexpensive and ubiquitous as today's cellular telephones.

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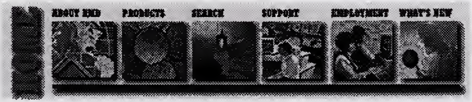

Last Updated 1/3/96

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SD186EM Demonstration Board

- ☐ Am186(TM) EM 40 MHz microcontroller
- ☐ PC-host target resident debugger
- ☐ 256K byte FLASH memory
- ☐ 256K byte SRAM
- ☐ PC/104 form factor
- ☐ Integrated serial port
- ☐ 8 LEDs controlled from the PIOs

Product Information

The SD186EM demonstration board is a fully functional stand-alone evaluation platform for the new Am186(TM)EM microcontroller. The Am186EM microcontroller integrates peripherals such as a DMA controller, memory controller, chip select, serial controller, programmable I/Os, and timers to increase system functionality while reducing overall cost. The memory controller supports a glueless connection to SRAM, EPROM, FLASH and pseudo-static RAM. The Am186EM microcontroller also features an innovative bus design that frees the processor to run at nearly twice the speed of standard 80C186 processors - without an increase in memory speed requirements.

This new demonstration board highlights the Am186EM microcontroller's serial port, glueless interface to SRAM and FLASH, expansion interface to peripheral attachments.

The SD186EM demonstration board's serial port serves as an interface to the FLASH resident debugger. The maximum baud rate of the integrated serial port is 1/32 of the internal processor frequency of 40 MHz. The debugger will support transfer rates from 9600 or 115.2K baud.

Contact Information

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AMPRO®
COMPUTERS, INCORPORATED

Originator of the PC/104 standard

EMBEDDED-PC
PC/104
MODULES

Request additional information by filling out this form.

The Leader in Embedded-PC Modules

Ampro Computers is widely recognized as the leading manufacturer of highly compact PC- and PC/AT-compatible microcomputer modules for embedded systems applications, and is proud to be the originator of the fastest growing embedded system standard, PC/104(tm).

Ampro's off-the shelf embedded-PC modules help original equipment manufacturers (OEMs) apply more of their resources to developing value-added, application-specific software and hardware, instead of needlessly reinventing proprietary embedded microcomputers. The result: reduced product development costs and risks, accelerated time-to-market, and enhanced product features.

For these reasons, hundreds of thousands of Ampro embedded-PC modules have now been built into numerous OEM embedded systems designs worldwide.

Typical applications include:

- Medical instruments
- Vehicular data acquisition and control
- Communications devices
- Vending machines
- Machine control
- Security systems
- Test equipment
- Point-of-sale products

Development Kits and Systems

To maximize the advantages of developing with Ampro's off-the-shelf embedded-PC modules, Ampro offers each Little Board, CoreModule, and MiniModule product as a "quick start" *development kit* for first time buyers. These *development kits* and systems provide what you need to start your project immediately, without having to speed time and energy hunting for cables, documentation, software, and other necessary components.

CoreModule Products

Ampro's CoreModule product family provides system developers with an ultra-compact form-factor coupled with maximum modularity and flexibility for use in adapting the industry standard PC and AT architecture to embedded control applications. CPU options range from the high end 486SLC-2 to the cost-effective 8088. These PC/104 form-factor CPU modules can be used as component-like engines plugged into an OEM circuit board; or they can be stacked with PC/104 expansion modules available from Ampro and hundreds of other companies.

Each CoreModule CPU offers a full set of onboard PC- and AT-compatible system functions, including CPU, RAM, BIOS, serial ports and parallel ports, keyboard and speaker interfaces, standard system controllers (DMA, interrupts, timers), and a battery backed real-time clock.

Little Board Products

Ampro's Little Board single-board systems provide embedded system designers with a full set of PC/AT-compatible system functions in the form-factor of a 5.25-inch disk drive. CPU options range from the high performance 486DX2 to the cost-sensitive 80386SX.

Peripheral Products

Ampro's PC/104(tm) form-factor MiniModule expansion products offer a modular, stackable way to meet your PC/104-based embedded system's exact requirements. Each MiniModule conforms to the popular PC/104 standard (3.6 x 3.8 inches: 90 x96mm).

MiniModule Functions Available:

- SuperVGA high resolution display controller
- VGA flat panel controller
- CGA multimode display controller
- LCD display controller
- Floppy & IDE disk controller
- Floppy, serial, SCSI interface
- Solid state disk expansion
- Dual-serial and parallel port expansion module
- RS485 interface option
- Ethernet LAN communications controller
- PCMCIA interface

Expansion Adapter Products

Ampro's expansion adapter products allow you to combine CoreModule(tm) or Little Board(tm) CPUs with standard PC/AT form-factor expansion boards or a larger number of PC/104(tm) modules, while maintaining the system's compactness, ruggedness, quality, and reliability.

Expansion Products Include:

- PC/104 carrier for Little Board
- PC bus adapter for Little Board
- Dual slot AT backplane for CoreModules or Little Boards
- Dual-stackthrough PC/104 bus cable adapter
- Dual PC bus backplane for CoreModules

Support Software Products

Ampro provides a comprehensive set of software support and utility programs to assist the developer in meeting the unique requirements of embedded systems.

- Embedded-PC BIOS and utilities
- Solid State Disk (SSD) support
- DR DOS 5.0 operating system
- Third-Party real-time and embedded operating systems support

Need More Information?

You can request additional information by filling out this filling out this form. or by contacting us at:

Ampro Computers, Inc.
990 Almanor Avenue
Sunnyvale, CA 94086 USA
Phone: (408) 522-2100
Fax: (408) 720-1305
E-Mail: sales@ampro.com

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AMPRO®
COMPUTERS, INCORPORATED

Originator of the PC/104 standard

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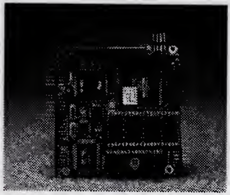

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HEWLETT-PACKARD, AMD ANNOUNCE RELATIONSHIP TO DEVELOP ADVANCED HANDHELD DEVICES

AUSTIN, TEXAS--MAY 3, 1995--Advanced Micro Devices and Hewlett-Packard Company announced today a long-term, strategic relationship to develop highly integrated solutions for the handheld computing market. This relationship will yield new handheld devices that combine advanced PC functionality and communications in a pocket form factor.

In this relationship, AMD and HP will work together to develop low-power, highly integrated, silicon engines ideal for the handheld market. This agreement will allow HP to maintain its leadership position in handheld computing.

HP is recognized as a leading innovator in handheld computing with products that combine a pocket form factor and compatibility with many off-the-shelf personal computing applications.

AMD's expertise in high-performance, integrated silicon engines is based upon competencies developed for its Élan family of processors which includes the Am386SC300 Silicon Engine for handheld computing. This device provides a low-power solution that combines a 32-bit x86 core, two PCMCIA controllers, serial and parallel ports and an LCD controller with complete PC/AT compatibility.

"The key to the Élan family is how AMD has produced a complete PC/AT system on a chip that can run on two AA batteries," said David Chavoustie, Embedded Processor Division vice president. "AMD is excited to be working with HP--the preeminent manufacturer of handheld devices. Our combined efforts will set new standards for portable computing and communications. End users want systems that combine communications and an easy-to-use PC companion capability."

"AMD is an ideal partner for us to develop these advanced devices with," said Kheng Joo Khaw, HP's general manager for the Asia Pacific Personal Computer Division. "Our shared value of the x86 and PC architectures and commitments to the handheld market will yield superior products during the course of this relationship."

Hewlett-Packard Company is a leading global manufacturer of computing, communications and measurement products and services recognized for excellence in quality and support. HP has 98,200 employees and had revenues of $25 billion in its most recent fiscal year.

Advanced Micro Devices, Inc., is the fourth-largest U.S. merchant-supplier of integrated circuits. Focusing on the personal and networked computing and communications markets, AMD produces microprocessors and related peripherals, memories, programmable logic devices, and circuits for telecommunications and networking applications. AMD has sales offices worldwide and manufacturing facilities in Sunnyvale, Calif.; Austin, Texas; Bangkok, Thailand; Penang, Malaysia; Singapore; Basingstoke, England; and Aizu-Wakamatsu, Japan.

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Hewlett-Packard, Larry Sennett (408) 553-2916

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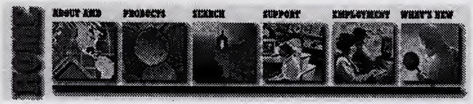
AMD news release #9550



Last Updated 5/3/95

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PC/104 Motherboard Products

- ☐ On-board Am386SX microprocessor
- ☐ Socket for optional coprocessor
- ☐ 16-bit, ISA Bus compatible with four PC/104 expansion connectors
- ☐ Up to 16M bytes of DRAM
- ☐ High performance SVGA controller with 512KB Video RAM
- ☐ Two asynchronous serial I/O ports
- ☐ Parallel printer port
- ☐ Floppy disk interface
- ☐ IDE hard drive interface
- ☐ AT compatible keyboard interface

Product Information

Micro Industries PC/104 Motherboard Products provide a single board solution for OEM applications. Designed with advanced CMOS technology, these products combine maximum performance with minimum power requirements.

The 386PC/16M4 is based on the industry standard AMD Am386SX. An optional coprossesor can be added for enhanced capabilities.

A variety of memory complements the CPU with options, including four sockets for up to 16M bytes of DRAM. In addition to the flexible memory organization, the baseboard supports a full complement of peripheral interfaces including: SVGA controller with 512KB Video RAM, AT compatible keyboard/speaker interface, floppy disk interface, a hard drive interface, a video module interface, two serial I/O ports and a parallel printer port, as well as a four PC/104 expansion connectors to provide integrated memory and I/O expansion in a half size, baby AT card format.

With features like the battery-backed real-time clock, watch dog timer, power fail detect and sleep mode operation, our 386PC/16M4 provide a cost-effective solution for OEM requirements that demand reliable operations.

Contact Information

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Fax: (614) 548-6184

E86 Tools

NORAND HANDHELD COMPUTER BASED ON AMD'S ÉLAN PROCESSOR

AUSTIN, TEXAS--JUNE 20, 1995--Advanced Micro Devices today announced that Norand Corporation has completed design of the PEN*KEY (TM) 6100, a rugged Windows-compatible handheld computer based on AMD's Élan(TM) processor. Shipment of the PEN*KEY 6100 computers are expected to begin in approximately 90 days.

The Élan processor is a 32-bit, PC/AT Windows® compatible system-on-a-chip targeted at pocket and handheld computers, smart phone and personal digital assistant applications. It features a low-voltage 32-bit 386 microprocessor core complete with power management features.

The processor features two PCMCIA 2.0 controllers, an LCD graphics controller, and serial and parallel ports. By adding only two TTL buffers, a peripheral interface and memory to the Élan device, computer designers can build a complete handheld system.

The Élan device supports all operating systems running on industry standard PC/AT architecture including Windows, Windows for Pen Computing, Geos, DOS, Penpoint and others.

"This is an extremely significant alliance," said N. Robert Hammer, Norand chairman, president and chief executive officer. "AMD brings to the relationship tremendous technological leadership in the creation of advanced, power efficient processors. Through the use of AMD innovations, Norand will continue to introduce robust mobile systems that excel in their ability to give mobile users what they want: processing power, ruggedness, local and wide area communications options, and graphics capabilities."

The PEN*KEY 6100 is a small (7" x 4.5" x 1.2") and lightweight (just 22 ounces) Windows computer. It features a 240 x 320 pixel display and offers two PCMCIA slots for memory and communications options. The 6100 is designed to withstand extreme temperatures and is shock resistant to four feet, making it ideal for use in industrial and field automation environments.

"AMD leveraged the broad range of design technologies and cores in its portfolio to produce the Élan device," said Dave Chavoustie, vice president of AMD's Embedded Processor Division. "Working closely with Norand, we optimized the Élan device to enable a new generation of powerful handheld devices like the PEN*KEY 6100."

The Élan Am386®SC300 device is available in 25- and 33-MHz versions in PQFP packaging. The 25-MHz version is priced at $49 per unit and the 33-MHz version is $53 in 10,000 piece quantities.

Advanced Micro Devices, Inc., is the fourth-largest U.S. merchant-supplier of integrated circuits. Focusing on the personal and networked computing and communications markets, AMD produces microprocessors and related peripherals, memories, programmable logic devices, and circuits for telecommunications and networking applications. AMD has sales offices worldwide and manufacturing facilities in Sunnyvale, Calif.; Austin, Texas; Bangkok, Thailand; Penang, Malaysia; Singapore; Basingstoke, England; and Aizu-Wakamatsu, Japan.

Norand designs, manufactures and markets mobile computing systems and wireless data communications networks using radio frequency technology. NORAND® systems allow businesses worldwide to apply information to industrial and field automation settings. Typical applications include route accounting, field sales automation and inventory database management in manufacturing, warehouse and retail settings. Norand and its partners provide hardware, application software, systems integration and support to thousands of customers in dozens of industries to improve accountability, productivity and management

control. Corporate offices are at 550 Second Street Southeast in Cedar Rapids, Iowa.

###

For further information contact:
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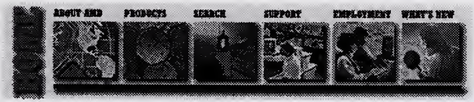
AMD news release #9561



Last Updated 6/20/95

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Phoenix®

NEWS RELEASE

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408-452-6507

Daniel McKean
The Benjamin Group, Inc.
408 559-6090

For Immediate Release:

PHOENIX TECHNOLOGIES INTRODUCES INDUSTRY'S FIRST PCMCIA SOLUTION DESIGNED FOR SPECIAL PURPOSE PCs

"PC Cards for the Planet" -
Phoenix PicoCard™ Enables PCMCIA Functionality for Embedded and Hand-held PCs, and Internet Appliances

Santa Clara, CA (Feb 5, 1996) -- Phoenix Technologies Ltd. (NASDAQ: PTEC), a leading supplier of essential software for PC manufacturers, today announced Phoenix PicoCard™, the first PCMCIA software designed specifically for the emerging Special Purpose PC market. Special Purpose PCs include hand-held organizers, smart phones, and new consumer appliances like internet terminals and set-top boxes, as well as a wide range of industrial applications. Phoenix PicoCard uses a unique (patent pending) software architecture to provide full PCMCIA functionality in a fraction of the memory space of previous solutions, even in systems using less than 1Mb of RAM, common in these emerging markets. PC Cards are increasingly being used for communication, personal storage, and expanded capabilities for these systems.

"Phoenix PicoCard ushers in a new era of PC Card capabilities for this new emerging market," said Gayn Winters, CTO of Phoenix Technologies. "Phoenix is committed to bringing innovative new products to market that are unsurpassed in quality, timeliness, and functionality. Phoenix PicoCard is a perfect example of this commitment as it will provide full PCMCIA functionality for hundreds of cards in a new generation of appliance systems, including emerging products like the $500 PC."

Phoenix PicoCard leverages years of Phoenix experience helping define the PC Card standard as well as the Phoenix PICO Group's experience in developing software specifically for the emerging Special Purpose PC market. The Phoenix PICO Group is already the world's leading supplier of system enabling software to this new market. PicoCard provides PC Card recognition, configuration, and robust power management for hundreds of PC Cards, including FAX/Modems,

Network Adapters, Wireless Adapters, and Storage cards. Phoenix PicoCard provides the ability to boot the system from a variety of PC Cards, including the new generation of Flash Translation Layer (FTL) FLASH cards. PicoCard also provides a Platform Verification Service to OEMs to certify their platforms for compatibility with hundreds of the new cards.

"Phoenix PicoCard delivers high-quality product capabilities and reflects Phoenix Technology's commitment to the needs of the hand-held market, said Chris Noble, General Manager of Information Services at Geoworks. "With Geoworks' focus on efficiency in operating system design we have elected to incorporate this superior technology in GEOS 3.0 which will ship in consumer computing devices this year." GEOS is the operating system on the new HP OmniGo 100 and Phoenix PICO recently signed a multi-year agreement with Hewlett Packard to provide software technology, including Phoenix PicoCard, on their new hand-held systems.

Phoenix PicoCard improves traditional PCMCIA software solutions by providing full PCMCIA functionality in one-third of the required memory space. Phoenix PicoCard also eliminates the need for point-enablers, PCMCIA drivers that support only on or two cards on a system.

The Phoenix PICO Group provides system enabling and system enhancing software for Special Purpose PCs to industry leading OEMs such as Radisys, Telxon, Norand, Sharp, JVC, Hewlett Packard, Motorola, Fujitsu, NEC, and many others. Information on Phoenix PICO Products, including educational papers on using x86 architecture for Special Purpose PCs, is available on-line at http://www.ptltd.com/pico.

Phoenix Technologies Ltd. is a worldwide leader supplying essential software to PC manufacturers. The company's system-level software products, such as PhoenixBIOS™, NoteBIOS™, PhoenixPICO™, and PhoenixCard Manager™, allow PC manufacturers to increase product differentiation, reduce product cycle time to market and reduce internal engineering costs. Capitalizing on its unique position and resources, Phoenix is developing an expanding family of software products, including Phoenix Telephony Suite™ and Phoenix MUSE™, that increase personal computer functionality and make PCs easier to use. Information on all Phoenix Technologies products is available on the Worldwide Web at: http://www.ptltd.com.

# # #

The Phoenix logo is a registered trademark and PhoenixPICO™, PicoCard™, PhoenixBIOS™, NoteBIOS™, MultiKey™, PhoenixCard Manager™, Save To Disk™, PowerPanel™, Phoenix Telephony Suite™, and Phoenix MUSE™ are trademarks of Phoenix Technologies Ltd. Other trademarks are the property of their respective owners.

FOR IMMEDIATE RELEASE:

PHOENIX TECHNOLOGIES TEAMS WITH INDUSTRY LEADERS TO DEMONSTRATE PERFORMANCE BENEFITS OF CARDBUS

PhoenixCARD Manager Provides Full CardBus PC Card Support In Upcoming Release

Santa Clara, CA (Feb 20, 1996) -- Phoenix Technologies Ltd. (NASDAQ: PTEC), a leading supplier of essential software for PC manufacturers, today announced a major breakthrough in the development of PC Card software support for the CardBus interface. CardBus is the 32-bit, high-performance PCI-based bus interface standard defined by the Personal Computer Memory Card International Association (PCMCIA) in its PC Card Standard. PhoenixCard Manager software, featuring support for CardBus, will allow Original Equipment Manufacturers (OEMs) and card vendors to bring their CardBus products to market faster, speed up industry acceptance of CardBus, and provide end-users with real CardBus products.

To provide support for CardBus, Phoenix has ported its industry leading PhoenixCARD Manager software to CardBus host controller silicon from both DataBook and Texas Instruments. Phoenix is currently working on customized CardBus ports for several major notebook manufacturers to be announced at a later date.

"Phoenix has the distinct advantage of having a team of engineers who have not only been able to develop the most robust PCI and PC Card software solutions for CardBus, they have also been instrumental in providing hardware level design consultation to our silicon vendor partners," said Rhod Williams, product line director for Phoenix's PC Card Software Development Group. "Because of our unique blend of talent our OEM customers and ultimately, end-users will be able to fully realize the benefits of CardBus including much faster throughput and performance than standard 16-bit PC Cards - particularly useful for network and multimedia type PC Cards."

"Phoenix Technologies shows a strong talent for developing software for cutting-edge technologies like CardBus," said Jeff Grammer, president and CEO of DataBook, Inc. "We have relied heavily on Phoenix to assist us in bringing up our hardware and taking it on the road for customer demonstrations. We are pleased to have Phoenix as an early software provider for our 87144 "Patriot" Cardbus/Zoom Video controller," added Grammer.

"Texas Instruments is proud to be the first silicon vendor to introduce and demonstrate a CardBus host controller, said Ed Agis, strategic marketing manager for Texas Instruments' PCIbus Solutions business unit." "Phoenix is one of the early software vendors to provide robust software as well as design consultation. Coupled with its worldwide support infrastructure and BIOS expertise, Phoenix is well-positioned to provide platform OEMs and card vendors alike a total software solution for TI 1130 CardBus designs," added Agis.

Phoenix joined the CardBus industry consortium called Yenta as a charter member in 1994. The group, spearheaded by Intel Corporation, has a mission to bring together all the leaders in the industry to develop CardBus related products. As one of the premier software Yenta members,

Phoenix has been instrumental in moving CardBus from specification stage through to real products that end-users can take advantage of.

Phoenix Technologies Ltd. is a worldwide leader supplying essential software to PC manufacturers. The company's system-level software products, such as PhoenixBIOS, NoteBIOS, PhoenixPICO, and PhoenixCARD Manager, allow PC manufacturers to increase product differentiation, reduce product cycle time to market and reduce internal engineering costs. Capitalizing on its unique position and resources, Phoenix is developing an expanding family of software products, including Phoenix Telephony Suite and Phoenix MUSE, that increase personal computer functionality and make PCs easier to use. Information on all Phoenix Technologies products is available on the Worldwide Web at: http://www.ptltd.com.

The Phoenix logo is a registered trademark and PhoenixPICO, PicoCard, PhoenixBIOS, NoteBIOS, MultiKey, PhoenixCard Manager&trade;, Save To Disk, PowerPanel, Phoenix Telephony Suite, and Phoenix MUSE are trademarks of Phoenix Technologies Ltd. Other trademarks are the property of their respective owners.

CONTACT:

Thomas Benoit | Phoenix Technologies Ltd. | 408-452-6507

Lisa Zwick | The Benjamin Group | 714-753-0755

PRO▪LOG

Thank you for inquiring about Pro-Log industrial computer products. We are the leader in high-quality, compact, rugged industrial computer systems and custom-engineered solutions. Our commitment to quality and over 20 years of experience has resulted in a reputation for reliable products. One that we back with a **5 year warranty.**

Pro-Log's multi-platform industrial computer strategy provides you with a choice of systems based on **the new *Compact*PCI, PCI Bus, ISA Bus** or **STD Bus.**

***Compact*PCI**
Offering the high performance of PCI bus in the more rugged Eurocard packaging. *Compact*PCI sets a new standard for very high performance and ruggedness. Pro-Log has been a leader in developing this standard and continues to pioneer new products in the marketplace. *Compact*PCI technology is becoming popular in applications like telecommunications and machine control because of it's high levels of performance, tolerance of shock vibration and temperature extremes. Mean Time Between Failure (MTBF) - measured in tens of thousands of hours - and compact size.

PCI
The highest performance bus today is PCI-Peripheral Component Interconnect. Virtually all high-end machines now use CPI to provide high-speed video networking, and data storage. The low-power requirements of PCI make it an ideal technology for the factory floor permitting dense circuit packaging and low radiated heat. Pro-Log's PCI family centers around passive backplane technology wherein all active circuitry resides on plug-in cards for a very low Mean Time To Repair (MTTR). Passive backplane PCI products are designed for telecommunications, data acquisition, and test and measurement applications.

ISA
Pro-Log provides high quality single board passive backplane computers for this popular standard. Backed by Pro-Log's expansive industrial experience and worldwide support, ISA bus computers are extremely cost-effective and are intended for the high volume OEM seeking a bus-based solution.

STD
STD bus is used all over the world because of it's small size, high shock, high vibration and extreme temperature ratings. Supported by a wealth of industrial I/O available form Pro-Log and hundreds of other manufacturers, STD is a versatile, cost-effective and proven standard.

If you would like additional information, please contact me at **(800) 252-3279**

Sincerely,

Suzanne Rhodes
Customer Success Emissary

Attachments: THE BUFFER, PCI/ISA/CPCI Brochure, STD Catalog, CompactPCI White paper, Concurrent Control Brochure, Compact PCI "They Work" & PICMG overview, I&CS Magazine article.

INDUSTRIAL
COMPUTERS

12 Upper Ragsdale Drive
Monterey, California 93940
408•372•4593 800•538•9570
Fax 408•646•3517
www.prolog.com

EPC-41 Single Board Computer

A cost effective solution for Embedded applications

The RadiSys EPC-41 single board computer show-cases the features of the Intel386 EX processor and is optimized for portable, space-constrained, low-cost embedded computer applications. Measuring only about 6 inches square, the EPC-41 delivers a highly integrated, compact and cost-effective 25 MHz Intel386 EX system in a proven, easy to use, standalone or expandable configuration. This "PC-like" system can run both DOS and Windows.Intel's commitment to support the 386 processor well into the future ensures that the EPC-41 will provide a lasting solution for embedded OEM applications.

The EPC-41 features flash memory for BIOS support, a 1 MB DRAM SIMM expandable to 16 MB, and an on-board single slot Type II PCMCIA controller. The EPC-41 can be operated as a standalone system with the on-board LCD/VGA graphics controller, IDE controller, PS/2-style mouse and keyboard interface, two serial ports, real-time clock with battery-backed RAM, watchdog timer and standard PC power supply connector.

Phoenix Technologies can provide much more information on the features of the BIOS.

| System Products Menu | Library | Information Request | Home Page |

Pro-Log Industrial Computers.... *They Work*!

Hardware/Software Compatibility & Environmental Test Results

February, 1996

PRO-LOG

Pro-Log's Industrial computer products are constantly being tested to insure compatibility with industry standard operating software, and vendor specific hardware and software products. This is just one of the ways we differentiate ourselves from our competition, and serve you better.

Compatibility Document Index

Software compatibility results... 3

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Shock and vibration specs... 7-8

Compatibility test completion letters

Software compatibility results

X = Tested Successfully **XC** = Tested/Certified to be compatible by SW vendor **U** = Untested

	I386SX 40H	I486DX2 -66H	I486DX4 -100H	I486DX4 -120H	I486DX2 -66	I486DX4 -100	I486DX4 -120	PIP5 -90	PIP5-100	PIP5-120	PIP5-133
OS/2 2.1		X	X	X	X	X	X	X	X	X	X
OS/2 Warp		XC	XC	XC	XC	XC	X	X	X	X	X
QNX 4.2		X	X	X	X	X	X	X	X	X	X
WFW 3.11	X	X	X	X	X	X	X	X	X	X	X
QAPlus 4.62	X	X	X	X	X	X	X	X	X	X	X
Intouch 5.0		X	X	X	X	X	X	X	X	X	X
Fix DMAC 5.0		X	X	X	X	X	X	X	X	X	X
WINDOWS NT 3.51		X	X	X	X	X	X	XC	XC	XC	XC
WIN '95		X	X	X	X	X	X	X	X	X	X
GE Cimplicity NT		U	U	U	U	U	U	XC	XC	XC	XC
LYNX O/S v2.1		U	U	U	U	U	U	X	X	X	X

Pro-Log PIP5 Pentium Passive Backplane PCI CPU Compatibility Test

The PIP5 was successfully tested at the PCI Compliance Workshop on September 20/21, 1995 by the PICMG Association, using these PCI and ISA products

VENDOR	PRODUCT NAME	PRODUCT REV	DRIVER REV	PRODUCT TYPE
Buslogic	BT-930W	A	1	SCSI
Buslogic	BT-930	A	1	SCSI
Buslogic	BT-948	A	1	SCSI
Comtrol Corp	Rocketport PCI	1	1	Multi-serial Port
Cornerstone Imaging	Image Accel	2	2	Graphics
Cyclone Microsystems	PCI 911	A	n/a	Intelligent I/O Controller
Cyclone Microsystems	PCI 80960	B	n/a	Intelligent I/O controller
Cyclone Microsystems	PCI 912	b	n/a	Intelligent I/O controller
DEC	ATMworks 350	blank	windows NT 3.5A	LAN
DEC	DC21130	Rev C	0-17	Graphics
DEC	21050/21052	blank	N/A	PCI to PCI bridge
DEC	DC21041	1	2.13	LAN
DEC	DC21140	2	2.13	LAN
DEC	DE450-TA	A01	1.09	LAN
DEC	DEFPA-AA	C01	1.63	LAN
DEC	DE500-XA	a01	1.09	LAN
DEC	DE450-CA	A01	1.09	LAN
DEC	DE435-AA	C01	2.1	LAN
DTC	DTC 3130W	n/a	n/a	SCSI
DTC	DTC 2132d	N/A	N/A	ide
Efficient Networks	ENI155P-MF-C	A	1.8	LAN
Equinox systems	SSP 4/8 P	A	A	multi ch. serial card
IBM	Cricket Stick	0		LAN
IBM	Auto Lanstreamer PCI	2	n/a	LAN
IBM	PCI Ethernet Adaptor	2	3	LAN
IBM	PCI Ethernet Adaptor	1	1	LAN
IBM	ATM 25 Adapter			ATM 25
Initio Corp	INI-9100W	1B	1.13	SCSI
Initio Corp	INI-9100	1b	1.13	SCSI

VENDOR	PRODUCT NAME	PRODUCT REV	DRIVER REV	PRODUCT TYPE
Intel	Ether Express Pro 100B	352509-003	1	LAN
Intel	EE Pro 100 Smart Adapter	1	1	LAN
Madge Networks	25 ATM PCI	1	1	LAN
Madge Networks	155 ATM PCI	1	1	LAN
Magma	PCI Expansion Box	01-03400-00A	N/A	uses PCI to PCI bridge
MuTech Corp	MV-1000 Video Digitizer	c or d	2	multi media
National Instruments	PCI-GPIB	B	A	instrument/test interface card
National Instruments	PCI-MXI-2	B	A	instrumentation/test interface card
Number Nine Visual Technology	Imagine 128	3	1.05	Graphics
Number Nine Visual Technology	9FX Motion 771	3	1.02	Graphics
Number Nine Visual Technology	9FX Vision 330	3	1.02	Graphics/uses PCI to PCI bridge
Number Nine Visual Technology	9FX Media 574	1	1	Graphics
Olicom A/S	OC-3136III	3	2.34	LAN
Omega Micro Inc	82C094GX	A	Cardsoft 3.1	PCMIA Host Controller
Proteon	P1690 plus	0	0	LAN
QLogic	Fast!SCSI Basic PCI	4	n/a	SCSI
QLogic	Fast!SCSI Basic PCI	n/a	n/a	SCSI
Rockwell Network Systems	Rockwell 2300-TX	Rev C	n/a	LAN
Rockwell Network Systems	Rockwell 2200-FD (D)	Rev D	Netware B1 71	LAN
SGS Thomson	STG 2000	blank	blank	Multimedia Accelerator
Sierra Semiconductor	Falcon/64	A.5	blank	Graphics
SMC	9432DMT	0	TBD	LAN
SMC	9432DMT	0	TBD	LAN

VENDOR	PRODUCT NAME	PRODUCT REV	DRIVER REV	PRODUCT TYPE
STB Systems	Powergraph 64 video	A	2.1	Graphics
STB Systems	Velocity 64 Video	B	2.11	Graphics
Symbios Logic Inc	89C621	1	1	IDE
Symbios Logic Inc	8600 SP	A	4	SCSI
Symbios Logic Inc	8751D	A	4	SCSI
Symbios Logic Inc	8251ASP	A	4	SCSI
Symbios Logic Inc	8751SP	A	4	SCSI
ThomasConrad	TC4048 130	Rev C	blank	LAN
ThomasConrad	TCVG048	RevB	blank	LAN
ThomasConrad	TC4048	RevB	blank	LAN
Video Logic	GrafixStar	TBD	TBD	Graphics
Video Logic	GrafixStar 700	1	1.2.1	Graphics
Western Digital	PCI SCSI Host Adapter	D	1.1	SCSI

Shock And Vibration Specs

Hard Disk Drive (Quantum Fireball SCSI)1

Parameter	Operating	Non-Operating
Temperature	0 to 55 C	-40 to 75 C
Temperature Gradient	24 C/Hr maximum	48 C/hr maximum
Humidity	5% to 85% rh @ 40 C	5% to 95% rh @ 46 C
Shock (1/2 sine wave 11ms duration 10 hits maximum)	6G (no soft errors) 10G (no unrecovered errors)	70G (no damage)
Vibration (Sine wave ppk, 1.0 octave per minute sweep)	0.5 Gpp 5-100Hz 0.033Gpp 300-500Hz (no recovered errors)	2.0 Gpp 5-500Hz (no damage)
Projected MTBF: 50,000 hours; 5 year component life; 40,000 start/stop cycles (minumum)		
Derated in current 760 chassis		
Vibration (sine wave ppk, 1.0 octave per minute sweep)	0.5 Gpp 5-100Hz 0.033 Gpp 100-200Hz (no recovered errors)	1.0 Gpp 5-100Hz 0.066 Gpp 100-200Hz (no damage)

Power Supply

Parameter	Operating	Non-Operating
Temperature	0 to 50 C	-40 to 70 C
Humidity	5% to 95% rh	5% to 95% rh
Shock (1/2 sine wave 11ms duration)	10G	40G
Vibration	0.25G pk 10-250Hz	0.25G pk 10-250Hz
MTBF of 100,000 hrs		
Derated in current 760 chassis		
Vibration (sine wave ppk, 1.0 octave per minute sweep)	0.25G pk 10-250Hz	0.25G pk 10-250Hz

PIP5

Parameter	Operating	Non-Operating
Temperature	0 to 60 C	-40 to 75 C
Humidity	5% to 95%rh	5% to 95%rh
Shock (1/2 sine wave 11ms duration)	10G	30G X axis (side-side) 40G Y & Z axes
Vibration	3G 3-200Hz	6G 3-200Hz
Derated in current 760 chassis		
Shock	10G	30G X axis (side-side) 40G Y& Z axes
Vibration (sine wave ppk, 1.0 octave per minute sweep)	0.5G 3-200Hz	2G 3-200H

Floppy Drive (Sony 3.5")

Parameter	Operating	Non-Operating
Temperature	5 to 50 C	-40 to 60 C
Humidity	8% to 80% rh	5% to 95%rh
Shock 1/2 sine wave 11ms duration	5.0G	70G
Vibration	0.5G 10-500Hz	2.0G 10-500Hz
Derated in current 760 chassis		
Shock	5.0G	70G
Vibration (sinewave ppk, 1.0 octave per minute sweep)	0.25G 3-100Hz	1G 3-100H

760 System

With FDD and HDD	In Operation	Non-Operation
Shock (1/2 sinewave, 11mS duration)	5.0G	30G X axis (side-side) 40G Y & Z axes
Vibration (sinewave ppk,2 octaves/min sweep)	0.25G (3-100Hz) 0.50G (3-70Hz)	1.0G (3-100Hz) 2.0G (3-70Hz)
Diskless Chassis	In Operation	Non-operation
Shock (1/2 sinewave, 11ms duration)	5.0G	30G X axes (side-side) 40G Y &Z axes
Vibration (sinewave ppk, 2 octaves/min sweep)	0.50G (3-200Hz)	2.0G (3-200Hz)

Ready for
OS/2 WARP

December 18, 1995

Doug Scott
Pro-Log Corporation
12 Upper Regsdale Drive
Monterey, CA 93940-5730

Dear Doug,

We are pleased to confirm to you that the submitted test results have passed the OS/2 Compatibility Test Kit. These test results were received at IBM for the System model listed below and identified in the configuration files submitted.

Pro-Log Corporation I486-66

Pursuant to the terms of the OS/2 Compatibility Test Kit License Agreement, you may disclose the test results contained in this letter.

Thank you for your cooperation in the OS/2 testing effort. OS/2 is the state of the art 32-bit operating system that customers worldwide are requesting.

IBM looks forward to an ongoing relationship between our two companies. Should you have further questions, please feel free to call Ron Fisher, OS/2 Compatibility Test Program Manager, at (407) 982-0512.

Sincerely,

Bill

Bill Bolger
Program Director, World Wide OEM Sales

Ready for
OS/2 WARP

December 18, 1995

Doug Scott
Pro-Log Corporation
12 Upper Regsdale Drive
Monterey, CA 93940-5730

Dear Doug,

We are pleased to confirm to you that the submitted test results have passed the OS/2 Compatibility Test Kit. These test results were received at IBM for the System model listed below and identified in the configuration files submitted.

Pro-Log Corporation I486H-120

Pursuant to the terms of the OS/2 Compatibility Test Kit License Agreement, you may disclose the test results contained in this letter.

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Sincerely,

Bill

Bill Bolger
Program Director, World Wide OEM Sales

Ready for
OS/2 **WARP**

December 18, 1995

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Pro-Log Corporation
12 Upper Regsdale Drive
Monterey, CA 93940-5730

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Bill

Bill Bolger
Program Director, World Wide OEM Sales

Ready for OS/2 WARP

December 18, 1995

Doug Scott
Pro-Log Corporation
12 Upper Regsdale Drive
Monterey, CA 93940-5730

Dear Doug,

We are pleased to confirm to you that the submitted test results have passed the OS/2 Compatibility Test Kit. These test results were received at IBM for the System model listed below and identified in the configuration files submitted.

Pro-Log Corporation PIP5

Pursuant to the terms of the OS/2 Compatibility Test Kit License Agreement, you may disclose the test results contained in this letter.

Thank you for your cooperation in the OS/2 testing effort. OS/2 is the state of the art 32-bit operating system that customers worldwide are requesting.

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Sincerely,

Bill

Bill Bolger
Program Director, World Wide OEM Sales

FANUC

GE Fanuc Automation

GE Fanuc Automation North America, Inc.
One Columbia Circle
Albany, NY 12203-5189
*518 464-4500 8*687-4500*
Fax 518 464-4613

December 14, 1995

Jeff Rhodes
Pro-Log Corporation
12 Upper Ragsdale Drive
Monterey, CA 93940

Dear Jeff:

I would like to thank you for all of your efforts to complete the certification of the PIP5 products with CIMPLICITY For Windows NT. Pro-Log's PIP5 PCI/ISA bus computers are a significant addition to the GE Fanuc list of certified hardware for CIMPLICITY MMI & MES/SCADA products. Your commitment to state-of-the-art industrial computer products combined with your tight adherence industry standards will provide our customers with a truly flexible integration platform to control industrial processes.

In addition, your ideas for a joint marketing/sales effort should also prove to be a win/win situation. Our customers are constantly looking for a proven industrial computer platform to run CIMPLICITY products. By staging CIMPLICITY on your PIP5 products, and making these available through standard GE Fanuc communication channels, you are providing a vital service for our customers.

Over the next two weeks we will be preparing a formal statement to our entire global sales force describing not only the certification of the PIP5, but also the details of our joint sales agreement. I look forward to meeting with you this Friday to finalize the details of this agreement.

Sincerely,

Jeff Wilson
CIMPLICITY Market Development Manager

BSI REGISTERED FIRM Certificate # FM13400
UL REGISTERED FIRM ISO 9001 Reg. #A2003
REGISTERED A Division of CSA

Microsoft Corporation
One Microsoft Way
Redmond, WA 98052-6399

Tel 206 882 8080
Telex 160520
Fax 206 936 7329

Microsoft

September 5, 1995

Jeff Rhodes
Pro Log Corporation
2555 Garden Road
Monterey CA, 93940
USA
Tel: (408) 646-3625
Fax: (408) 646-3517

Dear Jeff Rhodes,

Thank you for participating in the Windows NT Hardware Compatibility Test program. We have received your Windows NT 3.51 HCT results diskette(s) for the following model(s), **Pro Log PIP5/760 Pentium PCI/ISA System**.

The **Pro Log PIP5/760 Pentium PCI/ISA System** passed all required Windows NT 3.51 HCT tests and will be listed in the uniprocessor section of the next Windows NT HCL update.

The listed passing model(s) qualify for the Windows NT Compatible Logo. Please see attached logo agreement for details.

Please verify that the listed model name(s) are the correct marketed model names for the listed systems. If corrections are required, please send a fax marked "Attention: Thomas Wohllaib" to the above Microsoft fax number.

Once again, thank you for participating in the Windows NT HCT program. We look forward to receiving more Windows NT HCT results as you introduce new models into your product line.

Sincerely,

Thomas Wohllaib
Windows NT Hardware Compatibility Group

Microsoft Corporation is an equal opportunity employer.

Ready for
OS/2 WARP

October 26, 1995

Doug Scott
Pro-Log Corporation
12 Upper Regsdale Drive
Monterey, CA 93940-5730

Doug,

We are pleased to confirm to you that the submitted test results have passed the OS/2 Compatibility Test Kit. These test results were received at IBM for the System model listed below and identified in the configuration files submitted.

Pro-Log Corporation I486H (DX4/100)

Pursuant to the terms of the OS/2 Compatibility Test Kit License Agreement, you may disclose the test results contained in this letter.

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IBM looks forward to an ongoing relationship between our two companies. Should you have further questions, please feel free to call Ron Fisher, OS/2 Compatibility Test Program Manager, at (407) 982-0512.

Sincerely,

Bill

Bill Bolger
Program Director, World Wide OEM Sales

Ready for
OS/2 WARP

October 26, 1995

Doug Scott
Pro-Log Corporation
12 Upper Regsdale Drive
Monterey, CA 93940-5730

Doug,

We are pleased to confirm to you that the submitted test results have passed the OS/2 Compatibility Test Kit. These test results were received at IBM for the System model listed below and identified in the configuration files submitted.

Pro-Log Corporation I486 (DX4/100)

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Sincerely,

Bill

Bill Bolger
Program Director, World Wide OEM Sales

RadiSys announces new Single Board Computer

Intel to make it available as evaluation platform.

BEAVERTON, OR - August 28, 1995 - RadiSys Corporation, a leading supplier of PC-compatible embedded computers, today announced a new, highly integrated Intel386* EX processor-based single board computer - the EPC-41. Intel Corporation will make the board available as the EXPLR1 Embedded PC Evaluation Platform.

"The EPC-41 single board computer demonstrates the Intel386 EX processor features, and showcases its use in portable, space-constrained, low-cost embedded computer applications that need to run PC-compatible applications," said Steve Verleye, vice president of business development at RadiSys. "We continue to meet more and more OEM customers who are looking for PC-compatible embedded computer solutions without having to start from scratch with a new design."

Verleye added, "At the same time, new equipment designs often have small form factors and are portable. So there is a lot of interest in products like the EPC-41 that offer compact solutions using specialized embedded products such as the Intel386 EX processor."

Intel will make the EPC-41 available as the EXPLR1 - the first member of Intel's new Exploration Series of Evaluation/Reference Platforms for its embedded processor product family. The EXPLR1 starts with the EPC-41 and adds additional documentation and software useful in a product evaluation environment.

"The EXPLR1 Embedded PC Evaluation Platform represents an exciting new kind of platform for product development and design," according to Mark Gordon, Intel386 processor marketing manager. "We've created a complete embedded PC platform for a wide variety of applications, such as point-of-sale terminals, cash registers and pay point dispensing units, hand-held data loggers, medical displays and diagnostic equipment."

Gordon added, "With the availability of the EXPLR1 from Intel and its industrial distributors, customers can for the first time quickly and easily evaluate the Intel386 EX processor in an embedded PC environment. With RadiSys designing and manufacturing it for Intel, the option of buying the board in production quantities gives our customers a tremendous amount of flexibility in developing their applications."

The EPC-41 and EXPLR1 feature a 25 MHz Intel386 EX processor, 4 Mbit Boot Block Flash Memory, up to a 16 MB DRAM SIMM, and a single slot Type II PCMCIA controller. Both boards also use the new RadiSys R300EX memory/bus controller chip to provide the PC-compatible control necessary to support the Intel386 EX processor. They can be operated as stand-alone systems with the on-board LCD/VGA graphics controller, IDE controller, PS/2 style mouse and keyboard, two serial ports, real time clock (RTC) with battery-backed CMOS RAM, watchdog timer (WDT) and standard PC power supply connector. Access to system bus signals and digital I/O (DIO) is provided via two expansion headers.

Starting in late September, customers can purchase the EXPLR1 in small quantities from Intel or Intel's distributors. For more information and pricing on the EXPLR1, customers should contact an Intel distributor, the Intel sales office at 1-800-626-7256, Intel FaxBack at 1-800-628-2283 (request literature package No. 272768) or browse Intel's World Wide Web site at URL http://www.intel.com.

The EPC-41, available from RadiSys in volume, is well suited for use as a single board computer for OEM customers. Single unit pricing for the EPC-41 is set at $499 and volume discounts are available.

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RadiSys Corporation Reports 1995 Third Quarter Results

BEAVERTON, OR., October 25, 1995. RadiSys Corporation (NASDAQ symbol: **RSYS**) today reported that revenues increased 82 percent to $9,540,000 for the three months ended September 30, 1995 from $5,237,000 for the three months ended September 30, 1994. Revenues for the nine months ended September 30, 1995 increased 75 percent to $24,382,000 from $13,953,000 for the nine months ended September 30, 1994.

Income from operations increased 33 percent to $688,000 for the three months ended September 30, 1995 from $519,000 for the same period in 1994. For the nine months ended September 30, 1995, income from operations increased 39 percent to $1,267,000 from $910,000 for the same period in 1994.

Net income for the quarter was $461,000 or $0.11 per share compared with $518,000 or $0.13 per share for the same period in 1994. Net income for the nine months was $886,000 or $0.23 per share compared with $932,000 or $0.24 per share for the same period in 1994. The effective tax rate on corporate earnings for the third quarter of 1995 was 30 percent as compared to 4.4 percent for the third quarter 1994.

The Company completed today its initial public offering of 3,075,000 shares of common stock, 2,175,000 of which were sold by RadiSys and 900,000 which were sold by certain shareholders. The initial offering price was $12.00 per share.

RadiSys develops and manufactures embedded computer solutions used by OEMs for products in the manufacturing automation, telecommunications, medical devices, transportation, test and measurement, semiconductor to printed circuit board to packaged subsystems and at varying levels of customization, from standard products to full custom solutions.

RadiSys Corporation Consolidated Statement of Operations

(in thousands, except share amounts)

	Three Months Ended		Nine Months Ended	
	9/30/95	9/30/94	9/30/95	9/30/94
Revenues	$9,540	5,237	24,382	13,953
Cost of Sales	6,271	3,084	15,807	8,163

Gross Profit	3,269	2,153	8,575	5,790
Research and development	867	473	2,405	1,458
Selling, general and administrative	1,714	1,161	4,903	3,422
Income from operations	688	519	1,267	910
Interest income, net	(30)	23	(2)	65
Before income tax provision	658	542	1,265	975
Income tax provision	(197)	(24)	(379)	(43)
Net Income	$461	$518	$886	$932
Net income per share	0.11	0.13	0.23	0.24
Weighted average, number of common and equivalent shares outstanding	4,020,174	3,904,259	3,922,056	3,875,604

For more information contact:
Julie Nelson, McClenahan Bruer Burrows, 503-643-9035
Brian V. Turner, CFO, RadiSys Corporation, 503-646-1800

What's New Menu | Homepage

What's New at RadiSys Corporation

Business News

- 18 Dec 95 Distribution agreement signed with Hamilton Hallmark

Corporate Announcements

- 21 Feb 96 RadiSys to acquire MultiBus business from Intel Corp., Intel to Take 17% Equity Stake in RadiSys
- 1 Feb 96 RadiSys Corporation Reports Record Revenues for Fourth Quarter and Fiscal Year 1995

Component News

- 4 Dec 95 RadiSys announces First Embedded PC-System Controller for Intel 386EX CPU
- 28 Aug 95 RadiSys Announces first Memory and Bus controller for use with Intel 386EX CPU

System Product News

- 21 Feb 96 RadiSys to acquire MultiBus business from Intel Corp., Intel to Take 17% Equity Stake in RadiSys
- 15 Sept 95 SBC product family expanded with customizable high-integration EPC-33 and EPC-34 system modules
- 28 Aug 95 RadiSys announces a new single-board computer; Intel to make it available as Intel 386 EX evaluation platform.

On the WebSite

- The RadiSys Library has additions weekly!

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Old News

- ☐ 25 Oct 95 RadiSys Third Quarter 1995 Earnings Report
- ☐ 20 Oct 95 RadiSys stock trading opens on NASDAQ Report
- ☐ 9 Aug 95 EMC Product Family enhanced with EPC-26A and EPC-27 CPU modules.
- ☐ 9 Aug 95 RadiSys lands major computer contract with AAI/SMI
- ☐ 12 July 95 RadiSys provides embedded computers to Marquette Electronics, Inc.
- ☐ 29 June 95 SCAN-OPTICS, Inc. chooses RadiSys' embedded computers
- ☐ 13 April 95 RadiSys opens wholly-owned subsidiary in Japan
- ☐ 3 April 95 RadiSys and Network Express partnership results in new ISDN product.
- ☐ 3 April 95 ASCOM AUTELCA chooses RadiSys' embedded computers
- ☐ 27 March 95 RadiSys signs major development agreement with Harris Digital Telephone systems.

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Company Overview

Founded in 1983, S-MOS Systems designs, develops, markets, and manufactures custom, semicustom and standard integrated circuits and board-level products for the North American marketplace.

Our Standard Products business unit offers memories, controllers, drivers and microcomputers. The ASICs business unit provides design, support and manufacturing for ASICs and application specific standard products. Subsystem design and assembly is handled by the Board-Level Products business unit. In addition to all this, our Contract Manufacturing service provides a wide range of foundry, testing and packaging services.

Since beginning operation in 1983, S-MOS Systems has seen sales revenues rise from $11 million in its first year to $125 million just seven years later. That figure equals almost $1 million in revenue per employee in its core business, nearly ten times the industry average.

At S-MOS Systems, we have achieved something few Silicon Valley companies have been able to do. THrough our affiliation with the Seiko Epson COrporation in Japan, we have united the best abilities in the high-technology industry on both sides of the Pacific. We have successfully integrated American sales, marketing and engineering expertise with Japanese manufacturing prowess. The result is that we can now offer our customers more than half a century of proven, high-quality manufacturing experience to complement our own resourceful design experience.

Seiko Epson began operating in 1942. Since then, their innovative technology and manufacturing strengths have continued to develop, evident in the high-quality devices they produce.

Seiko Epson is on the leading edge in component packaging technology and is regarded by the Japanese high-tech manufacturing industry as the best in the business.

From the very beginning, the S-MOS/Seiko Epson affiliation has enabled us to become a major force in today's semiconductor market, prompting Business Week to list S-MOS Systems as one of the hottest new technology companies. Also, INC. magazine lists S-MOS Systems in the INC 500 as one of the fastest-growing, best-managed companies in the US.

While Seiko Epson is a major stockholder, S-MOS Systems is not a wholly owned subsidiary, but rather an independent California corporation. Seiko Epson serves as the primary source for S-MOS Systems manufacturing, and S-MOS Systems provides a sales and marketing channel for Seiko Epson semiconductor products in the United States.

The advantages of our affiliation are many. Both S-MOS Systems and Seiko Epson remain autonomous, but take advantage of each other's strengths. S-MOS can, if necessary, rely on additional sources for manufacturing. S-MOS can develop technology either in house or with the help of independent alliances. S-MOS also selects and services its own customers.

Return to S-MOS home page

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HAlF-SIZE AT BOARD FOR ULTRA SMALL FORM FACTOR SYSTEMS

Driven By S-MOS CARDIO

Goto Pictures

SAN JOSE, California, January 9, 1996 --- In keeping with its board product strategy for ultra small form factor systems, S-MOS is now offering a fully-functional ISA AT board that is half the size of today's standard ISA AT boards.

This new board measures 4" x 7" and is believed to be the smallest AT board of its kind. The board has all the standard I/Os, including IDE and floppy drive, VGA CRT and LCD panel, keyboard and mouse interface, two serial and one parallel port, BIOS and industry standard silicon necessary for a complete single board computer solution.

Powered by the S-MOS CARDIO, the AT board allows the systems designer to determine end system configuration without having to spend time and resources developing internal circuitry.

This continued extension of the S-MOS CARD PC is targeted for any hand-held or mobile system. Specific markets include test and measurement, remote/wireless data communications, as well as embedded applications like medical electronics, and industrial automation.

S-MOS can provide complete netlist (ORCAD) and board layout (PADS) schematics and specifications, to help reduce design time and to allow systems vendors to add their own proprietary value-added.

PRICE AND AVAILABILITY

This half-size ISA AT CARDIO board is available now and is priced at $350. Volume pricing is $300 in quantities of 100. This board does not include a CARDIO.

Quantity pricing for S-MOS CARDIO-486 (Intel 80486) version starts at $800 in quantity, $400 for the S-MOS CARDIO-386 (Intel 80386) version, and $195 for the S-MOS CARDIO-86 (Chips and Technologies 8-bit 8680) version.

All pricing is dependent on memory and system configuration. Call Bryan Chin, CARD Products Marketing Manager for more detail.

S-MOS also offers a full line of CARD products including PCMCIA, SRAM, flash, hard-disk and fax/modem cards, SIMMs, and an Intel-compatible PCMCIA card controller IC.

S-MOS has a national distribution network with Nu Horizons, Inc. of Amityville, New York and regional offices around the U.S.

S-MOS Systems, Inc., designs, develops and markets custom and semi-custom ICs, subsystems and

CARD products, and a variety of standard ICs for low-power applications in desktop and smaller computing systems and PCI-bus. The company also provides contract manufacturing through corporate affiliate, Seiko Epson Corporation. S-MOS was founded in 1983 and is privately held.

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Rob Gelphman
Gelphman Associates
408-451-8420

Customer contact:

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408-922-0200

S-MOS CARDIO-486DX4 100MHz

"Putting the PC in the System"

SAN JOSE, California, May 6, 1996 -- S-MOS Systems is increasing the performance capability and market potential of it's CARDIO product line, IBM PC AT credit-card sized PC subsystem, with its new CARDIO-486DX4 capable of up to 100MHz operating frequencies.

Measuring 3.4" x 2.2", this new member of the CARDIO family is targeted toward designers and vendors of handheld, portable and mobile systems. CARDIO-486DX2 is also available in 50MHz, 66MHz and 75MHz implementations.

Other enhancements that should appeal to designers of these remote communications and computing systems is on-board memory of up 32MB, a SVGA (super VGA) graphics accelerator, 512KB of VRAM and Flash ROM of up to 4MB.

"While we have experienced tremendous acceptance in the embedded systems market, and will continue our support in this area, we have received strong demand from our portable systems' customers to increase throughput and display resolution of our 486 version," said Joel Silverman, director of card products.

"Our response is to continue the upward migration path of all our CARDIO products with these new high-speed and improved display versions to meet the high-performance and functionality demands of our mobile computing customers," Joel said.

CARDIO offers all the functionality of a PC AT motherboard, packaged in a credit-card sized form factor, measuring 85.5mm x 54mm x 7.5mm. Because CARDIO uses industry-standard silicon, it is 100-percent DOS and Windows-compatible, further reducing design time and product development resources, and ensuring ready-made demand and customers

CARDIO-486DX4 also has on-board I/O ports for IDE hard disk drives (up to 8.3 GB) and IrDA SIR support.

Required power supply is 3.3 and 5.0 volts.

CARDIO's condensed size and ruggedized packaging make it ideal for a wide range of portable computing applications, enhanced by temperature range operation of 0 to 55 degrees Celsius and its ability to withstand up to 15G's of vibration.

Evaluation kits are also available, starting at $300, depending on components (memory, hard and/or floppy disk drive, LCD panel, etc.). Using S-MOS' half-size AT board reduces the cost of the evaluation unit even further.

The evaluation unit itself is designed for easy and self- taught configuration. Many customers have been able to begin preliminary test and debug of their design within one hour of setup of the CARDIO

evaluation unit.

Example pricing for the CARDIO-486DX4 75MHz is $1220 in quantities of 1,000. Pricing also depends on memory and other system configurations.

Please call Bryan Chin, S-MOS Card Products Marketing Manager (408-922-0200) for more information or for pricing on the other versions and other inquiries

Sampling is now with production quantities in May.

The company also offers a variety of card products including SRAM, PCMCIA, Flash, hard-disk, fax/modem and LCD modules, sold direct through satellite offices around the country and through Nu Horizons of Amityville, NY.

S-MOS Systems, Inc., designs, develops and markets custom and semi-custom ICs, subsystems and CARD products, and a variety of standard ICs for low-power applications in desktop and smaller computing systems and PCI-bus. The company also provides contract manufacturing through corporate affiliate, Seiko Epson Corporation. S-MOS was founded in 1983 and is privately held.

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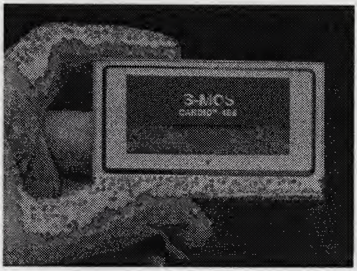
Card Products



S-MOS CARDIO-486 (TM) is a fully-functional IBM AT computer that is literally the size of a credit card. Measuring about 3.4 inches by 2.2 inches, this 100%, IBM-compatible personal computer is targeted for any handheld or personal/mobile computing, communications and instrumentation application a customer may choose.

S-MOS CARDIO is also suited for embedded systems such as factory automation, point-of-sale systems, test and measurement equipment, set-top boxes, global positioning systems and any other intelligence devices.

"With S-MOS CARDIO, designing an application's intelligence is already done, thus engineers can concentrate on specific product differentiating features," said Joel Silverman, director of S-MOS Card Products.

CARDIO-486 consists of an Intel486SL Super Chipset including 8Kb of cache and floating point unit (FPU). It also contains either 4, 8, 12, or 16MBof memory, PC AT BIOS ROM, plus an I/O controller with two serial ports, a parallel port and a speaker port. An I/O controller offers keyboard, mouse and analog signal inputs, and a VA subsystem provides LCD and CRT monitor outputs.

S-MOS CARDIO comes standard with a built-in floppy disk controller and port, and IDE port and an ISA bus interface. Al of the I/O ports are present via single, 236-pin connector interface--All-In-One-System-Interface (EASI).

S-MOS CARDIO-486 is available in 25 MHz or 33 MHz clocks, 4MB or 8MB of RAM. At 3.3 volts, the 25 MHz version with 4MB draws a maximum of only 890 milliamperes, and the same clock speed with 8MB of RAM draws only 1040 milliamperes.

The company also offers a variety of SRAM cards, flash memory cards, harddisk cards and fax/modem cards.

Go to Cardio home page

Return to S-MOS home page

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WinSystems®

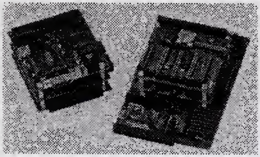
Member of the PC/104 Consortium

The WinSystems Commitment

Our experienced engineering and manufacturing talent has blended the personal computer architecture with industrial embedded applications which is reflected in our conservative, rugged product designs. We offer cost-effective solutions and are completely committed to be your supplier of choice for high-quality, fully-tested rugged PC-compatible products.

We have specialized in the design and manufacturing of embedded computers and I/O modules for use in industrial applications for over 12 years. And we have gained an excellent customer oriented reputation for innovative design and engineering skills.

WinSystems is recognized as a leading supplier of reliable PC/104 and STD bus products at a competitive price.



SBC Product Line Summary

- **SAT-486SLC, 386SX, V40 Single Board AT**

PC/AT compatible system features clock speeds up to 66MHz and 4Mbytes of memory. CPU options include a low-cost V40, 80386SX and high-performance 486SLC.

●**SBC-486SLC, 386SX Video SPC with Dual PC/104 Expansion**
Single board computer offering standalone operation along with maximum system expansion. Features include PCMCIA connector, VGA and flat panel controller.

●**LPM-486SLC, 386SX**
Fully PC-compatible STD Bus 80386SX and 486SLC single board computers with PC/104 expansion.

▨PC/104 I/O Module Product Line Summary

●**PCM-AIO 12-Bit Analog Module**
Up to 8 single-ended or 4 dual-ended plus 2 analog outputs.

●**PCM-AUDIO Audio Module**
Sound Blaster (tm) compatible module.

●**PCM-COM4 Four Channel Serial I/O**
RS-232/422/485 four-channel serial 8250 COM card.

●**PCM-CPC Color Flat Panel Controller**
VGA controller supports up to 640x480 with 256 colors.

●**PCM-CTC Counter/Timer Module**
Six channels of 16-bit counter/timers.

●**PCM-DSKIO IDE and Floppy Disk Controller Expansion Module**
IDE and floppy disk controller expansion module.

●**PCM-ENET Ethernet Controller**
Standard "AUI" and twisted pair supported.

●**PCM-IO48 Digital Input/Output Module**
48 channels of digital input/output.

●**PCM-MPC Monochrome Flat Panel Controller**
Low-cost, flat panel controller for monochrome panels.

●**PCM-SCC Synchronous Communication Module**
Dual channel, synchronous communication controller.

●**PCM-SCSI-2 SCSI Controller**
SCSI-2 compatible controller complete with BIOS.

●**PCM-SSD Solid State Disk**
Solid State disk expansion module supports up to 2MB RAM, EPROM, or Flash memory.

- **PCM-UIO48 Interruptible I/O**
  48 channel universal I/O with 24 lines of interrupt.
- **PCM-VGA Super VGA Controller**
  VGA graphics controller with 8 or 16-bit data paths. Supports resolutions up to 1024x768.
- **PCM-WW Prototyping Card**
  PC/104 prototyping expansion module.

For data sheets, call (817) 274-7553 or complete this form.

Development and Operating Systems

Our embedded products are supported by a variety of software options. They include operating systems, real time executives, utilities, and drivers all of which are hosted by a PC compatible environment.

ROM-DOS is an MS-DOS compatible operating system for our embedded 80X86 SBC's. ROM-DOS allows you to place the MS-DOS application in a diskless embedded system and have it start running immediately after power is applied. It runs entirely out of ROM and does not require a keyboard, video, or rotational media.

Vitually all drivers, utilities, and programs written for the DOS environment can be used without modification. ROM-DOS supports standard DOS files and disk management utilities which have been tailored to the embedded emvironment.

Software tools at your fingertips!

Many embedded applications are too harsh for floppy or hard disk drives because of shock, vibration, or temperature extremes. Solid State Disks (SSD) use RAM, EPROM, or Flash semiconductor devices to replace rotational media while offering high reliability, low power consumption, and compactness.

We offer extensive support for solid state disks on the SAT and SBC series of single board computers or through individual PC/104 and STD Bus SSD cards. The key benefit is to allow you to simply and easily convert applications into firmware without requiring special programming techniques or modification of the operating system.

STD Bus Products

We also offer a complete line of powerful STD Bus products including CPU boards, flat panel controllers, and I/O modules. Call today to receive our STD Databook.

Contact us

You can request additional information by filling out this form or by contacting us at:

WinSystems Inc.
715 Stadium Dr.
Arlington, Texas 76011 USA
Phone: (817) 274-7553
Fax: (817) 548-1358

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Appendix 2: Network-Centric Computing Application Drivers of Technology

TRAVEL SECTOR

Major NCC Initiatives: 1996 - 2001

Note: This sector includes airlines and railroads (passenger carrying), hotels and resorts, cruises and tours, travel agents.

- Next generation airline reservation systems
    - Tied more closely to internal airline operations
    - Many more capabilities for "outside" firms (hotels, rental car, etc.)
    - Decentralized: New platforms
    - Graphics/multimedia
    - Year 2000+
    - $10 billion+ investment during start-up period
- Interim, conventional reservation system replacement/improvement
    - Hotel, car rental
    - 1996+
    - $2-5 billion investment over 2-4 years
- Resort/cruise/tour: Sales and reservation systems
    - Multimedia (CD-ROM, on-line)
    - Transition/preparation for next-generation reservation systems
    - 1997+
    - $1 billion + investment over a 2-4 year period
- See also: Information Intermediaries sector

INFORMATION WAREHOUSE

Technical Categories	Importance* 1996	Importance* 2001	Opportunities/Comment
Very large databases	2	5	Key enabler - probably customized (especially for large reservation systems)
Hardware	2	4	
Turnkey			
Servers			
Software	3	5	
DB Managers			
Tools			
Decision Support			
Information Visualization	1	5	Pictures will be critical for travel sales
Hardware	1	3	
Software	1	5	
Analytic Software/ Methodologies	2	3	"Nice to have"
Specialized Input/ Output Products	1	3	Will assist in visualization

* Importance for application. Scale of 1 to 5, with 5 = High importance

TRAVEL SEGMENT: NCC TECHNOLOGY DRIVERS

MULTIMEDIA COMMUNICATION (WIDE BANDWIDTH)

Technical Categories	Importance* 1996	Importance* 2001	Opportunities/Comment
Hardware Products	1	4	Supports information warehouse
Network			
DB Servers			
Workstations			
Software Products	3	5	Key warehouse support
DB Managers			
Tools			
Security	1	4	Will be increasingly important to sellers
Hardware	1	3	
Software	1	4	
Consulting	2	5	
Communications Transport	3	3	Assumes continued favorable pricing and service trends
Content			
Commerce	3	5	Rationale for investment
Information	3	5	Rationale for investment
Entertainment	1	3	Future differentiator

* Importance for application. Scale of 1 to 5, with 5 = High importance

TRAVEL SEGMENT: NCC TECHNOLOGY DRIVERS

ON-LINE COMMUNICATIONS
(NARROW-BAND – INTERNET, COMMERCIAL SERVICES)

	Importance*		
Technical Categories	1996	2001	Opportunities/Comment
Hardware	5	3	Wide bandwidth is growth area, interim systems will still be important
Network Mgt	5	4	
Servers	3	2	
Software	5	3	Wide bandwidth is growth area, interim systems will still be important
Database			
Tools			
Security	3	3	
Hardware	2	2	
Software	3	3	
Consulting	3	3	
Content			
Commerce	5	3	Multimedia will supplement
Information	5	3	Multimedia will supplement
Entertainment	1	1	Few opportunities
Financial Transaction Processing	4	5	Key business justification

* Importance for application. Scale of 1 to 5, with 5 = High importance

TRAVEL SEGMENT: NCC TECHNOLOGY DRIVERS

HETEROGENEOUS NETWORKS

	Importance*		
Technical Categories	1996	2001	Opportunities/Comment
Design/Install	2	5	Current networks are usually closed; future will be much more open
Products	2	4	
Operations/Mgt Support	2	4	
Security	1	4	Current networks are usually closed; future will be much more open
Hardware	1	3	
Software	1	5	
Consulting	1	4	

* Importance for application. Scale of 1 to 5, with 5 = High importance

APPLICATIONS SOFTWARE

Type	Importance* 1996	Importance* 2001	Opportunities/Comment
Specific, predefined modules	1	4	Will become important in future to reduce cost of applications development

* Importance for application. Scale of 1 to 5, with 5 = High importance

APPLICATIONS SOFTWARE

Type	Importance* 1996	 2001	Opportunities/Comment
Modules	1	2	Relatively few opportunities

* Importance for application. Scale of 1 to 5, with 5 = High importance

SYSTEMS INTEGRATION

Type	Importance* 1996	Importance* 2001	Opportunities/Comment
Custom systems	2	5	The predominant development approach

* Importance for application. Scale of 1 to 5, with 5 = High importance

SUPPLY CHAIN MANAGEMENT

Major NCC Initiatives: 1996 - 2001

Note: This sector contains all of the following industry groups: Wholesale distribution and freight transportation; this sector contains the distribution management portions of manufacturing and retail distribution. Banks and other financial intermediaries play an important role, but are not included in this analysis.

Many of the key product-related elements of electronic commerce are contained in supply chain management.

- Product component supply management (to manufacturers)
    - Electronic ordering, invoicing and payments
    - "Advanced EDI"
    - Relatively small multimedia component
    - Ongoing linkage to internal manufacturing control and planning
    - $10 billion+ annual investment
- Finished product distribution
    - To wholesalers/retailers
    - Sales/order processes very important: Therefore, multimedia more important
    - $5 billion+ annual investment: Increasing
- Direct distribution to ultimate customer
    - Well advanced among business customers
    - In very early stages among individual consumers; enormous potential
    - Multimedia a critical differentiator
    - $1 billion+ annual investment: Rate of increase very high

INFORMATION WAREHOUSE

Technical Categories	Importance* 1996	2001	Opportunities/Comment
Very large databases	2	4	
Hardware			
Turnkey			
Servers			
Software			
DB Managers			
Tools			
Decision Support			
Information Visualization	2	5	
Hardware			
Software			
Analytic Software/ Methodologies	2	4	
Specialized Input/ Output Products	1	5	

* Importance for application. Scale of 1 to 5, with 5 = High importance

MULTIMEDIA COMMUNICATION (WIDE BANDWIDTH)

	Importance*		
Technical Categories	1996	2001	Opportunities/Comment
Hardware Products	1	4	
Network			
DB Servers			
Workstations			
Software Products	1	5	
DB Managers			
Tools			
Security	3	5	
Hardware			
Software			
Consulting			
Communications Transport	3	3	
Content			
Commerce	3	5	
Information	3	4	
Entertainment			

* Importance for application. Scale of 1 to 5, with 5 = High importance

ON-LINE COMMUNICATIONS
(NARROW-BAND -- INTERNET, COMMERCIAL SERVICES)

Technical Categories	Importance* 1996	 2001	Opportunities/Comment
Hardware	3	3	
Network Mgt			
Servers			
Software	3	4	
Database			
Tools			
Security	3	5	
Hardware			
Software			
Consulting			
Content			
Commerce	4	5	
Information	3	4	
Entertainment			
Financial Transaction Processing	3	5	

* Importance for application. Scale of 1 to 5, with 5 = High importance

HETEROGENEOUS NETWORKS

	Importance*		
Technical Categories	1996	2001	Opportunities/Comment
Design/Install	2	5	
Products	2	4	
Operations/Mgt Support	2	5	
Security	2	5	
Hardware			
Software			
Consulting			

* Importance for application. Scale of 1 to 5, with 5 = High importance

APPLICATIONS SOFTWARE

Type	Importance* 1996	 2001	Opportunities/Comment
Modules	2	5	New generation required

* Importance for application. Scale of 1 to 5, with 5 = High importance

SYSTEMS INTEGRATION

	Importance*		
Type	1996	2001	Opportunities/Comment
Complex systems integration	3	5	

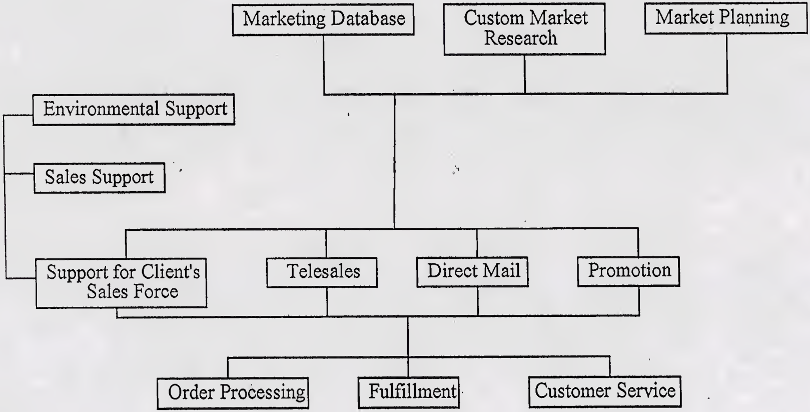
* Importance for application. Scale of 1 to 5, with 5 = High importance

INTERNAL CORPORATE FUNCTIONS IMPROVEMENT

Major NCC Initiatives: 1996 - 2001

- Sales and marketing activities
    - Marketing databases (data collection and analysis)
    - Traditional direct marketing (mail and telephone)
    - Electronic direct marketing
    - Integration with electronic commerce
    - Incremental shift from traditional to electronic
    - Traditional market size: $10 billion annual expenditures -- at least half is potentially replaceable by NCC applications.
- Administrative activities
    - Workflow processes (e.g., insurance policies, orders, loans, etc.)
    - Financial administration
    - Other administration
    - Many potential links to electronic commerce
    - Market size: $100 billion+ annual expenditures. Most is ultimately replaceable by NCC applications.

SALES SUPPORT FUNCTIONS: GENERAL OVERVIEW



Marketing Database

Custom Market Research

Market Planning

Environmental Support

Sales Support

Support for Client's Sales Force

Telesales

Direct Mail

Promotion

Order Processing

Fulfillment

Customer Service

SALES SUPPORT FUNCTIONS

Marketing Planning

Marketing Data

- Customer Demographics
- Purchasing Pattern Database

Custom Databases

- Installation
- Operations

Custom Market Research

Support for Client's Sales Force

- Environmental Support
  - Facilities
  - Human Resources
  - Sales Management Systems (Install)
- Sales Support
  - Collateral Materials (a)
  - Call Targets/ Lead Generation
  - Sales Management Systems (Operate)

Telesales (also generates leads for Sales Support)

SALES SUPPORT FUNCTIONS (cont'd)

Direct Mail

- Creative/Design
- Production

Promotions

Order Processing

- Credit/Credit Card Processing
- Statement Generation
- Item Processing

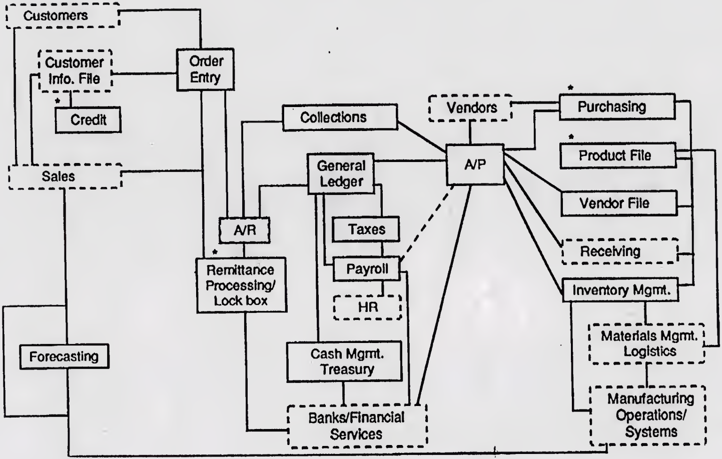
Fulfillment

- Shipping
- Inventory/Logistics Management

Customer Service

- System Installation
- System Operation

Financial Operations



☐ Fin'l Ops

▭ Other Functions

* Electronic Commerce Function

YNDB1

INFORMATION WAREHOUSE

Technical Categories	Importance* 1996	Importance* 2001	Opportunities/Comment
Very large databases	4	5	
Hardware			
Turnkey			
Servers			
Software	4	5	
DB Managers			
Tools			
Decision Support			
Information Visualization	2	4	
Hardware			
Software			
Analytic Software/ Methodologies	3	5	
Specialized Input/ Output Products	2	2	

* Importance for application. Scale of 1 to 5. with 5 = High importance

MULTIMEDIA COMMUNICATION (WIDE BANDWIDTH)

Technical Categories	Importance* 1996	2001	Opportunities/Comment
Hardware Products	2	5	
Network			
DB Servers			
Workstations			
Software Products	3	5	
DB Managers			
Tools			
Security	2	4	
Hardware			
Software			
Consulting			
Communications Transport	3	3	
Content			
Commerce	3	3	
Information	3	4	
Entertainment			

* Importance for application. Scale of 1 to 5, with 5 = High importance

ON-LINE COMMUNICATIONS
(NARROW-BAND -- INTERNET, COMMERCIAL SERVICES)

	Importance*		
Technical Categories	1996	2001	Opportunities/Comment
Hardware	3	3	
Network Mgt			
Servers			
Software			
Database	4	4	
Tools			
Security	3	3	
Hardware			
Software			
Consulting			
Content			
Commerce			
Information	5	4	
Entertainment			
Financial Transaction Processing	3	3	

* Importance for application. Scale of 1 to 5, with 5 = High importance

HETEROGENEOUS NETWORKS

	Importance*		
Technical Categories	1996	2001	Opportunities/Comment
Design/Install	2	3	
Products	2	3	
Operations/Mgt Support	3	3	
Security	2	4	
Hardware			
Software			
Consulting			

* Importance for application. Scale of 1 to 5, with 5 = High importance

APPLICATIONS SOFTWARE

	Importance*		
Type	1996	2001	Opportunities/Comment
Functional modules (e.g., decision support)	3	4	

* Importance for application. Scale of 1 to 5, with 5 = High importance

SYSTEMS INTEGRATION

Type	Importance* 1996	2001	Opportunities/Comment
Complex systems integration	2	4	

* Importance for application. Scale of 1 to 5, with 5 = High importance

INFORMATION INTERMEDIARY REPLACEMENT

Major NCC Initiatives: 1996 - 2001

- Potential "information agent" replacement
    - Insurance brokers
    - Travel agents
    - Real estate brokers
- Examples of additional opportunities: Medical information, goods and services
- Current agents are inefficient and expensive: Reflects difficulties in obtaining and processing information.
- Enablers: Multimedia and critical mass of on-line customers
- Room for a small number of suppliers.
- Late 1990s
- Revenue opportunity: $2 billion+

pfupres

INFORMATION WAREHOUSE

	Importance*		
Technical Categories	1996	2001	Opportunities/Comment
Very large databases	2	5	
Hardware			
Turnkey			
Servers			
Software			
DB Managers			
Tools			
Decision Support			
Information Visualization	1	5	
Hardware			
Software			
Analytic Software/ Methodologies	2	3	
Specialized Input/ Output Products	1	5	

* Importance for application. Scale of 1 to 5, with 5 = High importance

MULTIMEDIA COMMUNICATION (WIDE BANDWIDTH)

	Importance*		
Technical Categories	1996	2001	Opportunities/Comment
Hardware Products	1	5	
Network			
DB Servers			
Workstations			
Software Products	1	5	
DB Managers			
Tools			
Security	1	5	
Hardware			
Software			
Consulting			
Communications Transport	1	3	
Content			
Commerce	1	3	
Information	1	5	
Entertainment			

* Importance for application. Scale of 1 to 5, with 5 = High importance

ON-LINE COMMUNICATIONS
(NARROW-BAND -- INTERNET, COMMERCIAL SERVICES)

	Importance*		
Technical Categories	1996	2001	Opportunities/Comment
Hardware	2	1	
Network Mgt			
Servers			
Software	2	1	
Database			
Tools			
Security	2	1	
Hardware			
Software			
Consulting			
Content			
Commerce			
Information	2	1	
Entertainment			
Financial Transaction Processing	2	1	

* Importance for application. Scale of 1 to 5, with 5 = High importance

HETEROGENEOUS NETWORKS

Technical Categories	Importance* 1996	2001	Opportunities/Comment
Design/Install	1	5	
Products	1	3	
Operations/Mgt Support	1	5	
Security	1	5	
Hardware			
Software			
Consulting			

* Importance for application. Scale of 1 to 5, with 5 = High importance

APPLICATIONS SOFTWARE

	Importance*		
Type	1996	2001	Opportunities/Comment
Applications modules	1	2	Primarily a content issue

* Importance for application. Scale of 1 to 5, with 5 = High importance

SYSTEMS INTEGRATION

Type	Importance* 1996	Importance* 2001	Opportunities/Comment
Complex systems integration	1	4	
Outsourcing/ processing	2	5	

* Importance for application. Scale of 1 to 5, with 5 = High importance

HAlF-SIZE AT BOARD FOR ULTRA SMALL FORM FACTOR SYSTEMS

Driven By S-MOS CARDIO

Goto Pictures

SAN JOSE, California, January 9, 1996 --- In keeping with its board product strategy for ultra small form factor systems, S-MOS is now offering a fully-functional ISA AT board that is half the size of today's standard ISA AT boards.

This new board measures 4" x 7" and is believed to be the smallest AT board of its kind. The board has all the standard I/Os, including IDE and floppy drive, VGA CRT and LCD panel, keyboard and mouse interface, two serial and one parallel port, BIOS and industry standard silicon necessary for a complete single board computer solution.

Powered by the S-MOS CARDIO, the AT board allows the systems designer to determine end system configuration without having to spend time and resources developing internal circuitry.

This continued extension of the S-MOS CARD PC is targeted for any hand-held or mobile system. Specific markets include test and measurement, remote/wireless data communications, as well as embedded applications like medical electronics, and industrial automation.

S-MOS can provide complete netlist (ORCAD) and board layout (PADS) schematics and specifications, to help reduce design time and to allow systems vendors to add their own proprietary value-added.

PRICE AND AVAILABILITY

This half-size ISA AT CARDIO board is available now and is priced at $350. Volume pricing is $300 in quantities of 100. This board does not include a CARDIO.

Quantity pricing for S-MOS CARDIO-486 (Intel 80486) version starts at $800 in quantity, $400 for the S-MOS CARDIO-386 (Intel 80386) version, and $195 for the S-MOS CARDIO-86 (Chips and Technologies 8-bit 8680) version.

All pricing is dependent on memory and system configuration. Call Bryan Chin, CARD Products Marketing Manager for more detail.

S-MOS also offers a full line of CARD products including PCMCIA, SRAM, flash, hard-disk and fax/modem cards, SIMMs, and an Intel-compatible PCMCIA card controller IC.

S-MOS has a national distribution network with Nu Horizons, Inc. of Amityville, New York and regional offices around the U.S.

S-MOS Systems, Inc., designs, develops and markets custom and semi-custom ICs, subsystems and

CARD products, and a variety of standard ICs for low-power applications in desktop and smaller computing systems and PCI-bus. The company also provides contract manufacturing through corporate affiliate, Seiko Epson Corporation. S-MOS was founded in 1983 and is privately held.

Editorial contact:

Dan Beck
S-MOS Systems
408-922-0200

Rob Gelphman
Gelphman Associates
408-451-8420

Customer contact:

Request Literature
408-922-0200

S-MOS CARDIO-486DX4 100MHz

"Putting the PC in the System"

SAN JOSE, California, May 6, 1996 -- S-MOS Systems is increasing the performance capability and market potential of it's CARDIO product line, IBM PC AT credit-card sized PC subsystem, with its new CARDIO-486DX4 capable of up to 100MHz operating frequencies.

Measuring 3.4" x 2.2", this new member of the CARDIO family is targeted toward designers and vendors of handheld, portable and mobile systems. CARDIO-486DX2 is also available in 50MHz, 66MHz and 75MHz implementations.

Other enhancements that should appeal to designers of these remote communications and computing systems is on-board memory of up 32MB, a SVGA (super VGA) graphics accelerator, 512KB of VRAM and Flash ROM of up to 4MB.

"While we have experienced tremendous acceptance in the embedded systems market, and will continue our support in this area, we have received strong demand from our portable systems' customers to increase throughput and display resolution of our 486 version," said Joel Silverman, director of card products.

"Our response is to continue the upward migration path of all our CARDIO products with these new high-speed and improved display versions to meet the high-performance and functionality demands of our mobile computing customers," Joel said.

CARDIO offers all the functionality of a PC AT motherboard, packaged in a credit-card sized form factor, measuring 85.5mm x 54mm x 7.5mm. Because CARDIO uses industry-standard silicon, it is 100-percent DOS and Windows-compatible, further reducing design time and product development resources, and ensuring ready-made demand and customers

CARDIO-486DX4 also has on-board I/O ports for IDE hard disk drives (up to 8.3 GB) and IrDA SIR support.

Required power supply is 3.3 and 5.0 volts.

CARDIO's condensed size and ruggedized packaging make it ideal for a wide range of portable computing applications, enhanced by temperature range operation of 0 to 55 degrees Celsius and its ability to withstand up to 15G's of vibration.

Evaluation kits are also available, starting at $300, depending on components (memory, hard and/or floppy disk drive, LCD panel, etc.). Using S-MOS' half-size AT board reduces the cost of the evaluation unit even further.

The evaluation unit itself is designed for easy and self- taught configuration. Many customers have been able to begin preliminary test and debug of their design within one hour of setup of the CARDIO

evaluation unit.

Example pricing for the CARDIO-486DX4 75MHz is $1220 in quantities of 1,000. Pricing also depends on memory and other system configurations.

Please call Bryan Chin, S-MOS Card Products Marketing Manager (408-922-0200) for more information or for pricing on the other versions and other inquiries

Sampling is now with production quantities in May.

The company also offers a variety of card products including SRAM, PCMCIA, Flash, hard-disk, fax/modem and LCD modules, sold direct through satellite offices around the country and through Nu Horizons of Amityville, NY.

S-MOS Systems, Inc., designs, develops and markets custom and semi-custom ICs, subsystems and CARD products, and a variety of standard ICs for low-power applications in desktop and smaller computing systems and PCI-bus. The company also provides contract manufacturing through corporate affiliate, Seiko Epson Corporation. S-MOS was founded in 1983 and is privately held.

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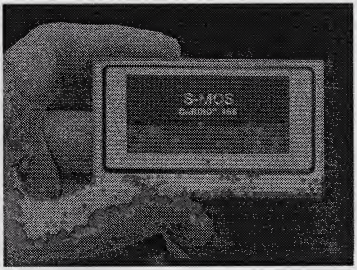
Card Products



S-MOS CARDIO-486 (TM) is a fully-functional IBM AT computer that is literally the size of a credit card. Measuring about 3.4 inches by 2.2 inches, this 100%, IBM-compatible personal computer is targeted for any handheld or personal/mobile computing, communications and instrumentation application a customer may choose.

S-MOS CARDIO is also suited for embedded systems such as factory automation, point-of-sale systems, test and measurement equipment, set-top boxes, global positioning systems and any other intelligence devices.

"With S-MOS CARDIO, designing an application's intelligence is already done, thus engineers can concentrate on specific product differentiating features," said Joel Silverman, director of S-MOS Card Products.

CARDIO-486 consists of an Intel486SL Super Chipset including 8Kb of cache and floating point unit (FPU). It also contains either 4, 8, 12, or 16MBof memory, PC AT BIOS ROM, plus an I/O controller with two serial ports, a parallel port and a speaker port. An I/O controller offers keyboard, mouse and analog signal inputs, and a VA subsystem provides LCD and CRT monitor outputs.

S-MOS CARDIO comes standard with a built-in floppy disk controller and port, and IDE port and an ISA bus interface. Al of the I/O ports are present via single, 236-pin connector interface--All-In-One-System-Interface (EASI).

S-MOS CARDIO-486 is available in 25 MHz or 33 MHz clocks, 4MB or 8MB of RAM. At 3.3 volts, the 25 MHz version with 4MB draws a maximum of only 890 milliamperes, and the same clock speed with 8MB of RAM draws only 1040 milliamperes.

The company also offers a variety of SRAM cards, flash memory cards, harddisk cards and fax/modem cards.

Go to Cardio home page

Return to S-MOS home page

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WinSystems®

Member of the PC/104 Consortium

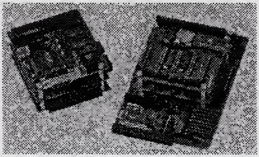
EMBEDDED-PC PC/104 MODULES

The WinSystems Commitment

Our experienced engineering and manufacturing talent has blended the personal computer architecture with industrial embedded applications which is reflected in our conservative, rugged product designs. We offer cost-effective solutions and are completely committed to be your supplier of choice for high-quality, fully-tested rugged PC-compatible products.

We have specialized in the design and manufacturing of embedded computers and I/O modules for use in industrial applications for over 12 years. And we have gained an excellent customer oriented reputation for innovative design and engineering skills.

WinSystems is recognized as a leading supplier of reliable PC/104 and STD bus products at a competitive price.



SBC Product Line Summary

- **SAT-486SLC, 386SX, V40 Single Board AT**

PC/AT compatible system features clock speeds up to 66MHz and 4Mbytes of memory. CPU options include a low-cost V40, 80386SX and high-performance 486SLC.

- **SBC-486SLC, 386SX Video SPC with Dual PC/104 Expansion**
  Single board computer offering standalone operation along with maximum system expansion. Features include PCMCIA connector, VGA and flat panel controller.

- **LPM-486SLC, 386SX**
  Fully PC-compatible STD Bus 80386SX and 486SLC single board computers with PC/104 expansion.

PC/104 I/O Module Product Line Summary

- **PCM-AIO 12-Bit Analog Module**
  Up to 8 single-ended or 4 dual-ended plus 2 analog outputs.

- **PCM-AUDIO Audio Module**
  Sound Blaster (tm) compatible module.

- **PCM-COM4 Four Channel Serial I/O**
  RS-232/422/485 four-channel serial 8250 COM card.

- **PCM-CPC Color Flat Panel Controller**
  VGA controller supports up to 640x480 with 256 colors.

- **PCM-CTC Counter/Timer Module**
  Six channels of 16-bit counter/timers.

- **PCM-DSKIO IDE and Floppy Disk Controller Expansion Module**
  IDE and floppy disk controller expansion module.

- **PCM-ENET Ethernet Controller**
  Standard "AUI" and twisted pair supported.

- **PCM-IO48 Digital Input/Output Module**
  48 channels of digital input/output.

- **PCM-MPC Monochrome Flat Panel Controller**
  Low-cost, flat panel controller for monochrome panels.

- **PCM-SCC Synchronous Communication Module**
  Dual channel, synchronous communication controller.

- **PCM-SCSI-2 SCSI Controller**
  SCSI-2 compatible controller complete with BIOS.

- **PCM-SSD Solid State Disk**
  Solid State disk expansion module supports up to 2MB RAM, EPROM, or Flash memory.

- **PCM-UIO48 Interruptible I/O**
48 channel universal I/O with 24 lines of interrupt.

- **PCM-VGA Super VGA Controller**
VGA graphics controller with 8 or 16-bit data paths. Supports resolutions up to 1024x768.

- **PCM-WW Prototyping Card**
PC/104 prototyping expansion module.

For data sheets, call (817) 274-7553 or complete this form.

Development and Operating Systems

Our embedded products are supported by a variety of software options. They include operating systems, real time executives, utilities, and drivers all of which are hosted by a PC compatible environment.

ROM-DOS is an MS-DOS compatible operating system for our embedded 80X86 SBC's. ROM-DOS allows you to place the MS-DOS application in a diskless embedded system and have it start running immediately after power is applied. It runs entirely out of ROM and does not require a keyboard, video, or rotational media.

Vitually all drivers, utilities, and programs written for the DOS environment can be used without modification. ROM-DOS supports standard DOS files and disk management utilities which have been tailored to the embedded emvironment.

Software tools at your fingertips!

Many embedded applications are too harsh for floppy or hard disk drives because of shock, vibration, or temperature extremes. Solid State Disks (SSD) use RAM, EPROM, or Flash semiconductor devices to replace rotational media while offering high reliability, low power consumption, and compactness.

We offer extensive support for solid state disks on the SAT and SBC series of single board computers or through individual PC/104 and STD Bus SSD cards. The key benefit is to allow you to simply and easily convert applications into firmware without requiring special programming techniques or modification of the operating system.

STD Bus Products

We also offer a complete line of powerful STD Bus products including CPU boards, flat panel controllers, and I/O modules. Call today to receive our STD Databook.

Contact us

You can request additional information by filling out this form or by contacting us at:

WinSystems Inc.
715 Stadium Dr.
Arlington, Texas 76011 USA
Phone: (817) 274-7553
Fax: (817) 548-1358

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Appendix 2: Network-Centric Computing Application Drivers of Technology

TRAVEL SECTOR

Major NCC Initiatives: 1996 - 2001

Note: This sector includes airlines and railroads (passenger carrying), hotels and resorts, cruises and tours, travel agents.

- Next generation airline reservation systems
    - Tied more closely to internal airline operations
    - Many more capabilities for "outside" firms (hotels, rental car, etc.)
    - Decentralized: New platforms
    - Graphics/multimedia
    - Year 2000+
    - $10 billion+ investment during start-up period
- Interim, conventional reservation system replacement/improvement
    - Hotel, car rental
    - 1996+
    - $2-5 billion investment over 2-4 years
- Resort/cruise/tour: Sales and reservation systems
    - Multimedia (CD-ROM, on-line)
    - Transition/preparation for next-generation reservation systems
    - 1997+
    - $1 billion + investment over a 2-4 year period
- See also: Information Intermediaries sector

INFORMATION WAREHOUSE

Technical Categories	Importance* 1996	Importance* 2001	Opportunities/Comment
Very large databases	2	5	Key enabler - probably customized (especially for large reservation systems)
Hardware	2	4	
Turnkey			
Servers			
Software	3	5	
DB Managers			
Tools			
Decision Support			
Information Visualization	1	5	Pictures will be critical for travel sales
Hardware	1	3	
Software	1	5	
Analytic Software/ Methodologies	2	3	"Nice to have"
Specialized Input/ Output Products	1	3	Will assist in visualization

* Importance for application. Scale of 1 to 5, with 5 = High importance

TRAVEL SEGMENT: NCC TECHNOLOGY DRIVERS

MULTIMEDIA COMMUNICATION (WIDE BANDWIDTH)

	Importance*		
Technical Categories	1996	2001	Opportunities/Comment
Hardware Products	1	4	Supports information warehouse
Network			
DB Servers			
Workstations			
Software Products	3	5	Key warehouse support
DB Managers			
Tools			
Security	1	4	Will be increasingly important to sellers
Hardware	1	3	
Software	1	4	
Consulting	2	5	
Communications Transport	3	3	Assumes continued favorable pricing and service trends
Content			
Commerce	3	5	Rationale for investment
Information	3	5	Rationale for investment
Entertainment	1	3	Future differentiator

* Importance for application. Scale of 1 to 5, with 5 = High importance

ON-LINE COMMUNICATIONS
(NARROW-BAND -- INTERNET, COMMERCIAL SERVICES)

	Importance*		
Technical Categories	1996	2001	Opportunities/Comment
Hardware	5	3	Wide bandwidth is growth area, interim systems will still be important
Network Mgt	5	4	
Servers	3	2	
Software	5	3	Wide bandwidth is growth area, interim systems will still be important
Database			
Tools			
Security	3	3	
Hardware	2	2	
Software	3	3	
Consulting	3	3	
Content			
Commerce	5	3	Multimedia will supplement
Information	5	3	Multimedia will supplement
Entertainment	1	1	Few opportunities
Financial Transaction Processing	4	5	Key business justification

* Importance for application. Scale of 1 to 5, with 5 = High importance

TRAVEL SEGMENT: NCC TECHNOLOGY DRIVERS

HETEROGENEOUS NETWORKS

	Importance*		
Technical Categories	1996	2001	Opportunities/Comment
Design/Install	2	5	Current networks are usually closed; future will be much more open
Products	2	4	
Operations/Mgt Support	2	4	
Security	1	4	Current networks are usually closed; future will be much more open
Hardware	1	3	
Software	1	5	
Consulting	1	4	

* Importance for application. Scale of 1 to 5, with 5 = High importance

APPLICATIONS SOFTWARE

	Importance*		
Type	1996	2001	Opportunities/Comment
Specific, predefined modules	1	4	Will become important in future to reduce cost of applications development

* Importance for application. Scale of 1 to 5, with 5 = High importance

```
                    ***************************
                    ***   ACTIVITY REPORT   ***
                    ***************************

TRANSMISSION OK

TX/RX NO.                  2838
CONNECTION TEL                       12037372413
CONNECTION ID              YNHH/MIS
START TIME                 03/07 15:27
USAGE TIME                 02'04
PAGES                        5
RESULT                     OK
```

Original - Pls make
cc for

- Angela
- me
- project file
- Mt View
- Paul Connolly (UK)

Tom

(no rush)